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EDISON ELECTRIC INSTITUTE

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF MAY (Preliminary)

	1936	1935	%
Kilowatt-hours Generated* (Net)			
By Fuel	4,901,914,000	4,000,670,000	+22.5
By Water Power	3,551,243,000	3,457,810,000	+ 2.7
Total Kilowatt-hours Generated	8,453,157,000	7,458,480,000	+13.3
Additions to Supply			
Energy Purchased from Other Sources	151,206,000	177,693,000	−14.9
Net International Imports	85,782,000	64,575,000	+32.8
Total	236,988,000	242,268,000	− 2.2
Deductions from Supply			
Energy Used in Electric Railway Departments	44,860,000	44,530,000	+ 0.7
Energy Used in Electric and Other Departments	112,930,000	111,373,000	+ 1.4
Total	157,790,000	155,903,000	+ 1.2
Total Energy for Distribution	**8,532,355,000**	**7,544,845,000**	**+13.1**
Energy Lost in Transmission, Distribution, Etc.	**1,447,631,000**	**1,400,065,000**	**+ 3.4**
Kilowatt-hours Sold to Ultimate Consumers	**7,084,724,000**	**6,144,780,000**	**+15.3**
Sales to Ultimate Consumers (kw-hrs)			
Domestic Service	1,164,724,000	1,060,451,000	+ 9.8
Commercial—Small Light and Power (Retail)	1,266,203,000	1,098,782,000	+15.2
Commercial—Large Light and Power (Wholesale)	3,975,184,000	3,345,688,000	+18.8
Municipal Street Lighting	179,907,000	174,998,000	+ 2.8
Railroads—Street and Interurban	353,781,000	353,863,000	− 0.0
Railroads—Electrified Steam	77,016,000	65,792,000	+17.1
Municipal and Miscellaneous	67,909,000	45,206,000	+50.2
Total Sales to Ultimate Consumers	7,084,724,000	6,144,780,000	+15.3
Total Revenue from Ultimate Consumers	$164,014,600	$153,202,700	+ 7.1

DURING TWELVE MONTHS ENDING MAY 31st

Kilowatt-hours Generated* (Net)			
By Fuel	60,164,156,000	53,301,602,000	+12.9
By Water Power	36,909,058,000	33,433,175,000	+10.4
Total Kilowatt-hours Generated	97,073,214,000	86,734,777,000	+11.9
Purchased Energy (net)	2,990,715,000	2,876,524,000	+ 4.0
Energy Used in Electric Railway and Other Departments	1,947,472,000	1,974,431,000	− 1.4
Total Energy for Distribution	**98,116,457,000**	**87,636,870,000**	**+12.0**
Energy Lost in Transmission, Distribution, Etc.	**16,331,063,000**	**14,972,907,000**	**+ 9.1**
Kilowatt-hours Sold to Ultimate Consumers	**81,785,394,000**	**72,663,963,000**	**+12.6**
Total Revenue from Ultimate Consumers	**$1,969,077,500**	**$1,870,323,500**	**+ 5.3**
Important Factors			
Percent of Energy Generated by Waterpower	38.0%	38.5%	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kw-hr)	695	646	+ 7.6
Average Revenue per kw-hr (Cents)	4.88¢	5.22¢	− 6.5
Average Monthly Bill per Domestic Customer	$2.83	$2.81	+ 0.7

BASIC INFORMATION AS OF MAY 31st

Generating Capacity (kw)—Steam	23,979,600	23,740,400	
—Waterpower	9,011,900	8,949,900	
—Internal Combustion	498,700	500,800	
Total Generating Capacity in Kilowatts**	33,490,200	33,191,100	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(595,253)	(538,786)	
Farms in Western Area (Included with Commercial—Large)	(220,627)	(212,134)	
Domestic Service	21,245,808	20,653,652	
Commercial—Small Light and Power	3,782,806	3,736,936	
Commercial—Large Light and Power	493,307	499,583	
Other Ultimate Consumers	62,747	71,102	
Total Ultimate Consumers	25,584,668	24,961,273	

* By courtesy of the U. S Geological Survey with deductions for certain plants not considered Electric Light and Power Enterprises.
**Old series both years—subject to revision to agree with data contained in Statistical Bulletin No. 3.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume IV JULY, 1936 No. 7

The Cost of Electric Service

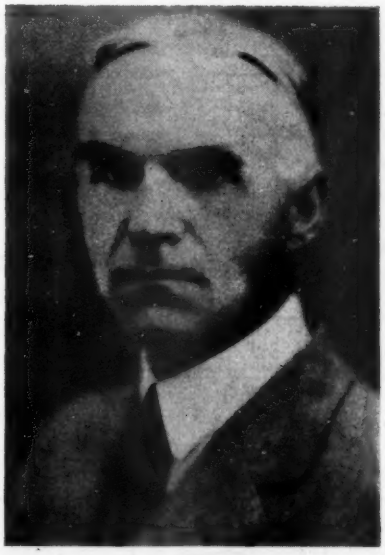
By N. R. Gibson

Vice President, Buffalo, Niagara and Eastern Power Corp., Buffalo, N. Y.

An address before the First General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 1, 1936

UNLIKE most commodities, electricity must be produced and delivered to the consumer at the moment he demands it. Storage of it is impracticable. It follows, therefore, that the generation, transmission, and distribution of electric energy is unique in the commerce of the world. It is not to be expected that methods employed in the distribution of commodities may be used as a rational guide for the electric utility industry. In fact, electricity is not a commodity at all, but an agent of energy. The relations between a producer and consumer of electric energy are more nearly like those of landlord and tenant than those of merchant and purchaser. Each consumer utilizes a part of the generating, transmitting, and distributing equipment comprising the power system and receives in some proportion a benefit from all the forces employed in operating the entire system. He virtually rents a part of the facilities maintained for his use.

Electric power has many advantages. Among these are its adaptability to many varied uses and the facility with which it may be economically distributed over wide areas. The natural result arising from such advantages has been the development of exceedingly complex electric distribution systems from which power is supplied to industrial and commercial establishments, transportation systems, municipal lighting systems, residences, and farms. The same system will serve one or more of such uses, but no two systems will have the same proportion of several uses. Furthermore, the proportion of power required and used for different purposes in the same system will vary from time to time and the distribution system itself will change from year to year to meet these changing needs.



MR. GIBSON

The Electric Utility Company Not a Complete Monopoly

Limited Privileges

While it may be stated that an electric utility usually enjoys an exclusive right or privilege of engaging in the business in a specified territory, it does not follow that this privilege enables the company enjoying it to raise the price of its product and services above their real value or above the price they would bring under competition. The tobacco business is a monopoly in some countries and the alcoholic liquor business in others. But electricity is not a commodity such as those for which there are no substitutes, but is merely a form or agent of energy for which several substitutes are available.

The Domestic Consumer

The average domestic consumer uses only a small amount of electric energy. He, therefore, may consider that the supply of his requirements of energy for lighting and appliances such as flat irons, washing machines, vacuum cleaners, radios, and so forth, which use only relatively small quantities of electricity, is monopolistic in character.

The larger domestic consumer, however, rests secure in the fact that his requirements of energy for use in refrigerators, cooking ranges and hot water heaters can be supplied from competitive sources—oil and gas. Further, these are so highly competitive that they act as a leaven which exerts a strong influence on the general price level of electricity used for all domestic purposes. This fact will be made clearer by reference to the relation between the prices for gas and electricity for cooking ranges and hot water heaters. For instance, when the price of electricity for heating water is one and one-half cents per kwhr, such price is equivalent to $1.50 per 1,000 cu ft of artificial gas having a calorific value of 540 Btu per cu ft. It is equivalent to coal for this purpose at $38.00 per ton. When used for cooking ranges, electricity at one and one-half cents per kwhr is equivalent to 97 cents per 1,000 cu ft of artificial gas.

Different Characters of Electric Systems

The problems involved in the generation, transmission, distribution and utilization of electrical energy are manifold.

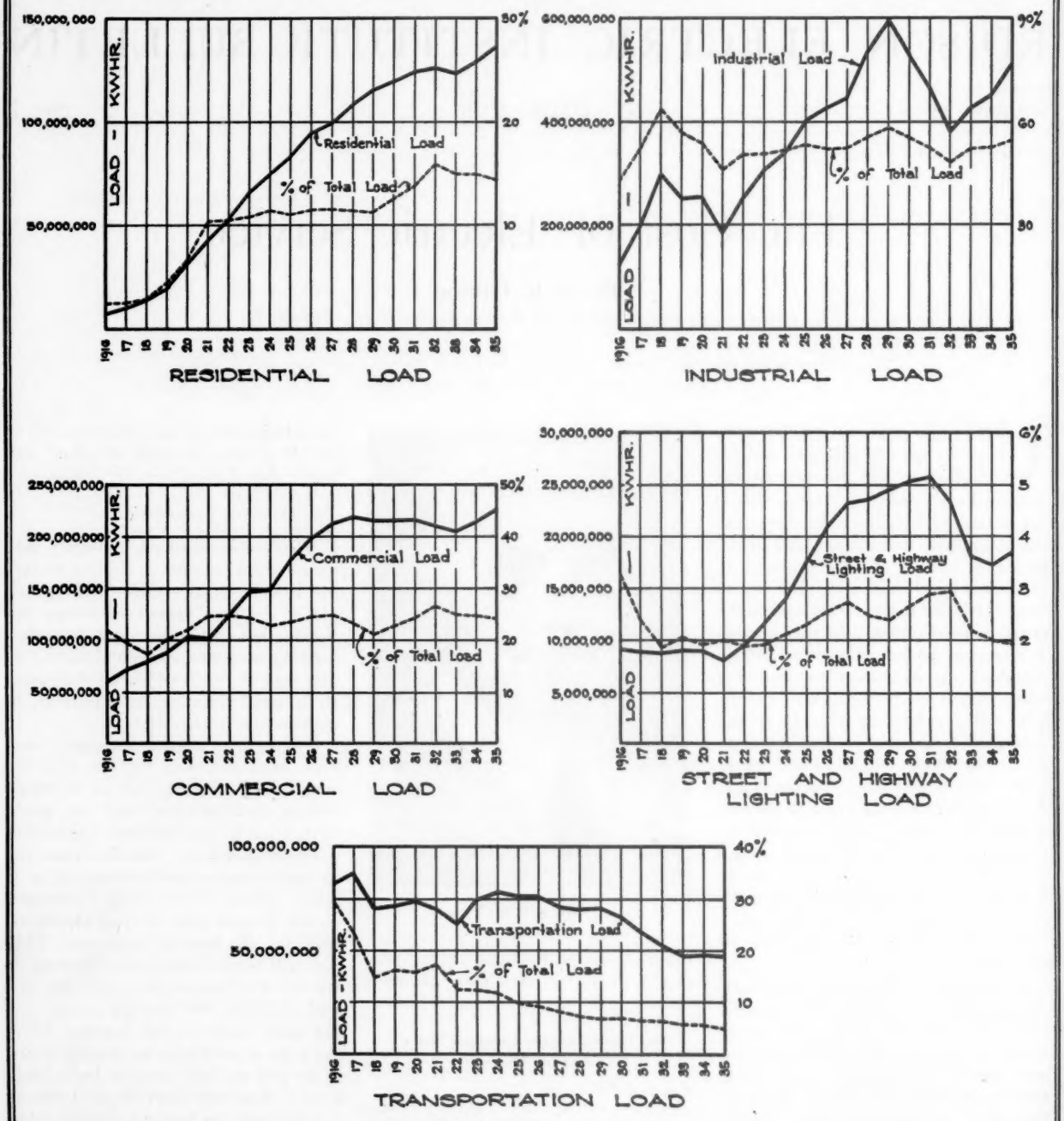

150,000,000
100,000,000
50,000,000
LOAD — KWHR.
50%
20
10
Residential Load
% of Total Load
1916 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
RESIDENTIAL LOAD
600,000,000
400,000,000
200,000,000
LOAD — KWHR.
90%
60
30
Industrial Load
% of Total Load
1916 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
INDUSTRIAL LOAD
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
LOAD — KWHR.
50%
40
30
20
10
Commercial Load
% of Total Load
1916 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
COMMERCIAL LOAD
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
LOAD — KWHR.
6%
5
4
3
2
1
Street & Highway Lighting Load
% of Total Load
1916 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
STREET AND HIGHWAY LIGHTING LOAD
100,000,000
50,000,000
LOAD - KWHR.
40%
30
20
10
Transportation Load
% of Total Load
1916 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
TRANSPORTATION LOAD
COMPANY A
YEARLY SALES OF ENERGY TO VARIOUS CLASSES OF CONSUMERS AND PERCENTAGE OF TOTAL SALES TO THESE CLASSES.
1916 - 1935

Figure 1

No two electrical systems are alike. This makes the problems appear more complicated than they really are when an attempt is made to relate the operations of one system to those of another. Some systems generate electrical energy entirely in hydro stations, some in steam or internal combustion engine stations, others in both of these types, while still other systems rely entirely on energy purchased from other companies. Some systems supply only high density areas, some supply a combination of high and low density areas and others supply only areas of low density. All systems deal with the distribution of electrical energy, but the factors associated with the generation and delivery of the energy to the ultimate consumer may vary widely in different places and change from time to time in each individual system.

Proportion of Power Required by Various Classes of Consumers

The same distribution system serves one or more and usually all of the several classes of service, but no two systems will have the same proportion of the several uses. For example, Table I, which gives the sales of two companies, designated B and C, whose fixed capital is approximately the same, whose distribution area is contiguous, and whose total kwhr sales are about equal and yet whose relative sales to various classes of customers are greatly different.

TABLE I

	Percentage of Total Sales	
Class of Service	*Company B*	*Company C*
Farm	0.91	0.53
Residential	9.36	47.95
Commercial	7.23	32.98
Industrial	70.22	13.46
Transportation	7.94	0.00
Street and Highway Lighting	1.88	4.89
Municipal Miscellaneous	2.46	0.19
Total	100.00	100.00

The proportion of power required and used for different purposes in the same system will vary from time to time and the system itself will likewise change to meet changing needs. For example, Fig. 1 shows the kwhr sales to various classes of consumers by Company A for the years 1916 to 1935 inclusive. The dotted line on these charts also shows the percentage of the total sales represented by the various classes of service for these years. It may be noted that residential sales which represented about 2.5% of the total sales in 1916 increased to about 10% in 1921. During the next 8 years this percentage remained almost constant, reaching 11% in 1929. However, between 1929 and 1932 the percentage of total sales to this class increased to 16%. A similar chart shows sales by central stations for the country as a whole in Fig. 2.

The changing industrial load in periods of prosperity and depressions; the migration of industries such as that of the cotton business from New England to the South and the shoe business from New England to the Middle West; the gradual replacement of electric railways by buses and automobiles; the increasing volume of sales to farm and residence customers following the invention and introduction of new labor-saving appliances; the increase in commercial lighting for shops, stores, display windows, and advertising and the extension of rural lines, are all factors which have contributed to the ever-changing character of the utility system.

Impracticability of Determining Standard Formula for Cost of Distribution of Electricity to Any Class of Consumers

Costs for Various Classes of Service

The principal element entering into the cost of electricity is the cost of the capital and the taxes thereon required for the generating plants, transmission lines, distribution systems and general property, and their maintenance, insurance and retirement. The costs of operating personnel and materials, except fuel for power generation, while important, are relatively a smaller proportion of the total system costs.

In the early stages of the development of the electric utility industry the managers of the property realized that the use of the facilities during only a few hours a day must result in high unit costs to the users. This idea was clearly stated by Dr. John Hopkinson in 1892, when he said:

"In the case of most manufacturers it matters not if the thing made is made today or tomorrow, in the morning or the evening, for it will not be used for a month hence perhaps; the thing can in fact be extensively stored and kept till it is wanted. Other services must be rendered at the moment the person served desires . . .

" . . . Electrical Engineers now realize that they have to provide the same plant and no more to give a steady supply day and night as to give a supply for one hour out of the twenty-four. They also now realize that if they are to be ready to give a supply at any moment, they must burn much coal and pay much wages for however short a time the supply is actually taken.

"A supply of electricity must be delivered at the very moment when the consumer chooses to use it, and as long and no longer than he pleases to use it; it cannot be very readily or cheaply stored, and much of the cost of production is the fixed charge for plant and conductors. . . ."

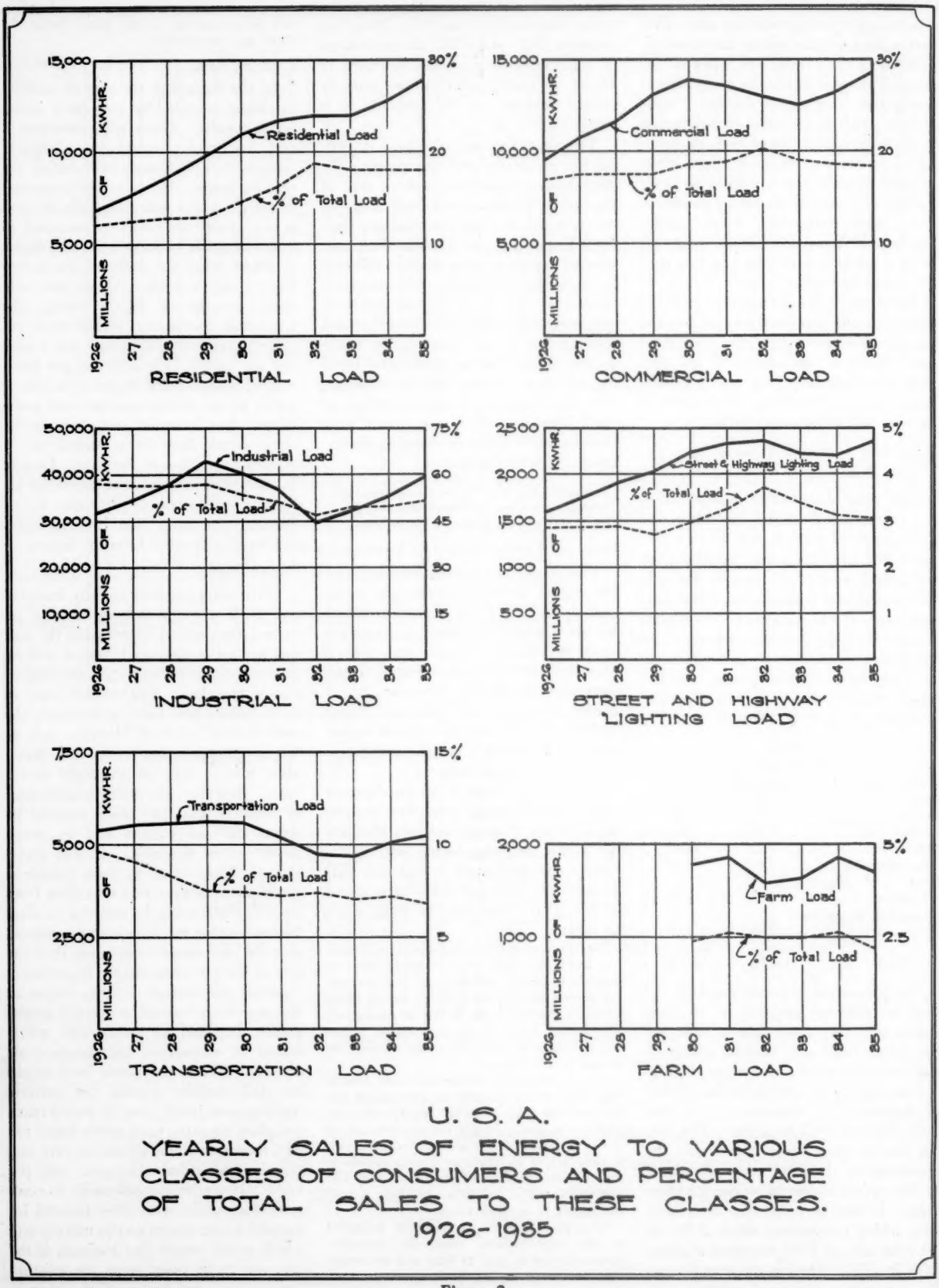
Lighting Load

In the beginning the electric utilities furnished service to customers using lighting only. There was, therefore, a very restricted demand for electricity confined to a high peak load during the evening hours. For over three-quarters of the day there was practically no load at all. Since the total cost incurred in conducting the business had to be borne by those using the facilities for a few hours a day, and since this use was only about one-quarter of the energy the plant and distribution system were capable of supplying, the result was a high cost per kwhr. The unit cost per kwhr was, of course, much higher than that to which we are now accustomed and much higher than it would have been if the plant could have been loaded for a greater proportion of the time. Despite this condition, the value of electricity for lighting service was so great that its use continued to grow and it successfully competed with other forms of lighting.

Power Load

With plant capacity already installed and fixed charges thereon already incurred, the problem of reducing the unit cost per kwhr was clearly one of making this capacity work for a greater proportion of the time. The obvious thing to do to reduce unit costs, particularly the costs related to fixed charges, such as interest, depreciation, taxes and insurance, was to take on industrial power load. However, the power requirement of industry was then being supplied by steam and gas engines and by water power where available. It was necessary to demonstrate to these industrial establishments, first, that electricity from central plants could be supplied to them without undue interruption and, second, that the cost would be no more than the cost of their existing supply of power.

When the electric utilities began to compete with isolated industrial power plants they had to make rates which would be competitive and therefore attractive. While the power load would not fall entirely outside the evening lighting peak in all cases, it would make the plant capacity work more hours per day, increase volume of output very materially and reduce the unit cost per kwhr. It was found impossible to compete successfully with these isolated industrial power plants and to make a rate which would secure that business, if the rate was to be based upon the existing average cost per kwhr of the electric



U. S. A.

YEARLY SALES OF ENERGY TO VARIOUS CLASSES OF CONSUMERS AND PERCENTAGE OF TOTAL SALES TO THESE CLASSES. 1926-1935

Figure 2

utility then serving only a lighting load. It was realized clearly, however, that the additional cost to the electric utility of taking on the power load would be much less per kwhr than the existing average cost. It was found that a rate could be made which would be competitive, would secure a substantial power load, and would, at the same time, pay all of the additional cost thereby incurred and something in addition thereto.

Transportation Load

In the same manner and with the same principles in mind, considerable business was developed in the supply of electricity to railways. This class of load had a particularly good load factor, operating many hours per day. Again a rate could be made which would secure this business, pay all of the additional costs of supplying the electricity to the railways and in addition contribute toward the other expenses of the electric utility.

In large measure, the power loads and the railway business thus obtained could not have been secured except upon the additional cost basis. When this load had been added, the unit cost of generating and distributing electricity was materially reduced because of better load factor, diversity of use and larger volume of output and sales. Net earnings were increased and lighting rates could be and were reduced.

A practical example illustrating the results obtained by the application of this principle of adding different classes of load to an electric generating and distributing system serving a small community is given in Fig. 3.

Attractive New Business

The principle involved is an old one, recognized and used in industrial enterprises, generally, that a class of business is attractive at rates which will pay all of the direct costs incurred in the business and contribute something to the general costs of operation. This principle has been demonstrated as economically sound. It complies, of course, with no arbitrary rule of determining the cost of service to any class of consumers; it must depend upon judgment of those conducting the enterprises, a thorough knowledge of the competitive situation and, last but not least, it must be based upon courage, initiative and good salesmanship.

Cost of Service

Cost of service is a most disappointing will-o-the-wisp when an attempt is made to fix that cost for the various types and classes of service furnished. Cost of service to any one customer or to any class of customers has about as many different values as there are theorists trying to find them. The electric utility industry has grown so fast, the progress of the art has been so rapid and the relationship of one class of service to the other has changed so often that an analysis of cost at any time by classes of service at best can only be used to guide the judgment of the management in fixing prices which will support the business as a whole.

Cost of Operation

The costs of operation of an electric utility do not vary with any single factor. The amount of electricity generated and sold, the number of customers served, the character of the industries in the territory and other elements all affect costs. There are many items of expense which are not directly affected by either output or number of customers but are controlled almost entirely by the capacity of the plant and system required. There are certain large elements of cost which are general for the entire business, necessary for the conduct of the business but chargeable directly to no particular class of customers or class of service. These general expenses cannot be divided in the electric utility business any more than they can be divided in any other industry. They constitute a problem in the apportionment of the total cost to various classes of service about which there is great argument among economists, accountants and others. Much depends on the approach to the problem, and upon the views and sometimes the prejudices of the analyst.

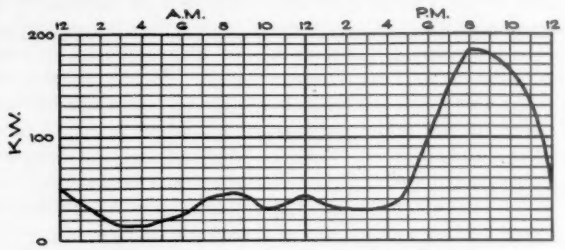
There is no particular difficulty in ascertaining the amount of money required to purchase and install one kilowatt in generating plant capacity. Nor is there much difficulty in determining what fixed charges will be incurred in the way of taxes, depreciation and interest thereon. The cost of generating a kwhr may be determined with fair accuracy, knowing the volume of the output, load factor and the operating conditions. As soon, however, as an attempt is made to allocate these costs among various classes of customers with varying demands and different characteristics of use and changing in their relationship almost daily, then the difficulty begins. Class demands do not occur at the same time, but at various times during the day. The demands of the several classes change materially with the seasons. One kilowatt of demand by a class of customers does not mean that one kilowatt of plant capacity is required for that class. It may require one or considerably less than one kilowatt of plant capacity to serve that class, depending upon the diversity and time of occurrence of the demands of the several classes served. Some large industrial loads which fall entirely outside the system peak load may be taken on with no increase in plant capacity at all because they simply fill up valleys in the load curve. Still others may require a kilowatt of system capacity, plus an adequate proportion of spare capacity, for each kilowatt of their peak demand. Therefore the cost of plant capacity and hence the cost of fixed charges for a certain class of service will vary over a wide range under varying conditions. Of course, no class of customers, or no class of service should be a burden upon other classes. Each class should pay all of the additional cost incurred to serve that class and in addition contribute something toward the reduction of the total average cost so that all classes may share in the benefit of the additional load.

While these things are recognized as sound principles in the rational development of an electrical system from the engineering, economic or accounting standpoint, there is in addition a legal requirement which cannot be overlooked, namely, that there shall be no unjust discrimination as between customers. What this means is simply that like service furnished to like customers under like conditions must be furnished at like rates.

Theory That Reduction In Price of Electricity Will Be Followed Immediately By Increased Use Sufficient to More Than Offset Loss of Revenue is True Only Within Certain Limits

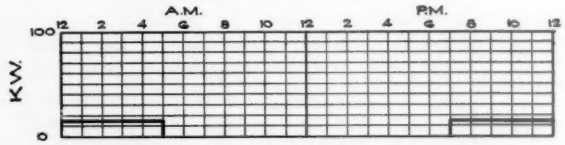
Market Analysis

It has been stated that reduction in the price of electric service for domestic purposes always produces increased consumption and immediate restoration of revenue. The unqualified acceptance of this statement is certainly not warranted by the facts. That it has usually been possible to sell more electricity when reductions in price have been made in the past should not be taken as conclusive evidence that it has always been possible to do so or that further reductions will produce a like effect in the future. Quantitative analysis must always be made to determine the extent of the prospective market in which the sales are to be made. This analysis will necessarily include a



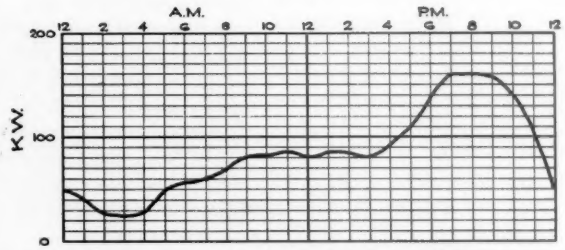
I. RESIDENTIAL SERVICE

I: RESIDENTIAL SERVICE
IF SERVED ALONE, THE AVERAGE COST PER KWHR. WOULD BE 9.6¢



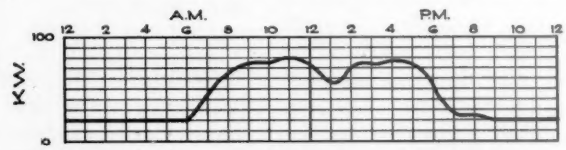
II. STREET LIGHTING SERVICE

II: STREET LIGHTING SERVICE
IF ADDED TO THE RESIDENTIAL SERVICE, THE AVERAGE COST PER KWHR. WOULD BE REDUCED TO 9.2¢. THE INCREMENT COST FOR STREET LIGHTING SERVICE WOULD BE 5¢ PER KWHR.



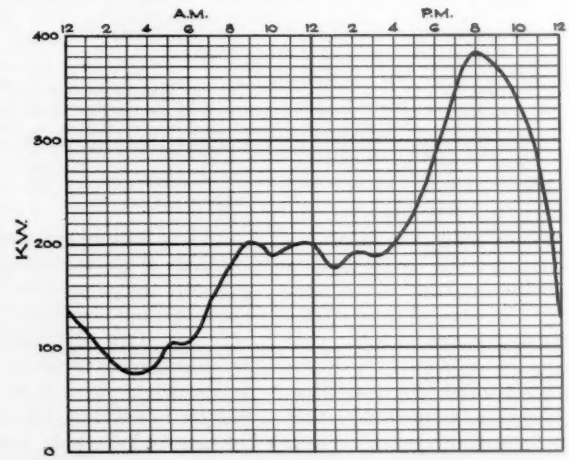
III. COMMERCIAL LIGHT & POWER AND MUNICIPAL WATER PUMPING SERVICE

III: COMMERCIAL LIGHT & POWER AND MUNICIPAL WATER PUMPING
IF ADDED TO THE RESIDENTIAL AND STREET LIGHTING SERVICE, THE AVERAGE COST PER KWHR. WOULD BE FURTHER REDUCED TO 8.2¢. THE INCREMENT COST FOR THIS INDIVIDUAL CLASS OF SERVICE WOULD BE 2.75¢ PER KWHR.



IV. SMALL INDUSTRIAL SERVICE

IV: SMALL INDUSTRIAL SERVICE
IF ADDED TO THE RESIDENTIAL, STREET LIGHTING AND COMMERCIAL SERVICE, THE AVERAGE COST PER KWHR. WOULD BE FURTHER REDUCED TO 5.5¢ PER KWHR. THE INCREMENT COST FOR THE SMALL INDUSTRIAL SERVICE WOULD BE 2.2¢ PER KWHR.



V. THE LOAD CURVE OF THE COMBINED CLASSES OF SERVICE

V: THE LOAD CURVE OF THE COMBINED CLASSES OF SERVICE
DUE TO THE IMPROVEMENT IN THE USE OF FACILITIES, THE AVERAGE COST PER KWHR. IS 5.5¢ AS COMPARED WITH 9.6¢ WHEN THE FACILITIES WERE USED ONLY BY THE RESIDENCE CUSTOMERS.

TYPICAL DAILY LOAD CURVES OF VARIOUS CLASSES OF SERVICE IN A SMALL COMMUNITY SERVED BY AN ISOLATED ELECTRIC GENERATING AND DISTRIBUTION SYSTEM

Figure 3

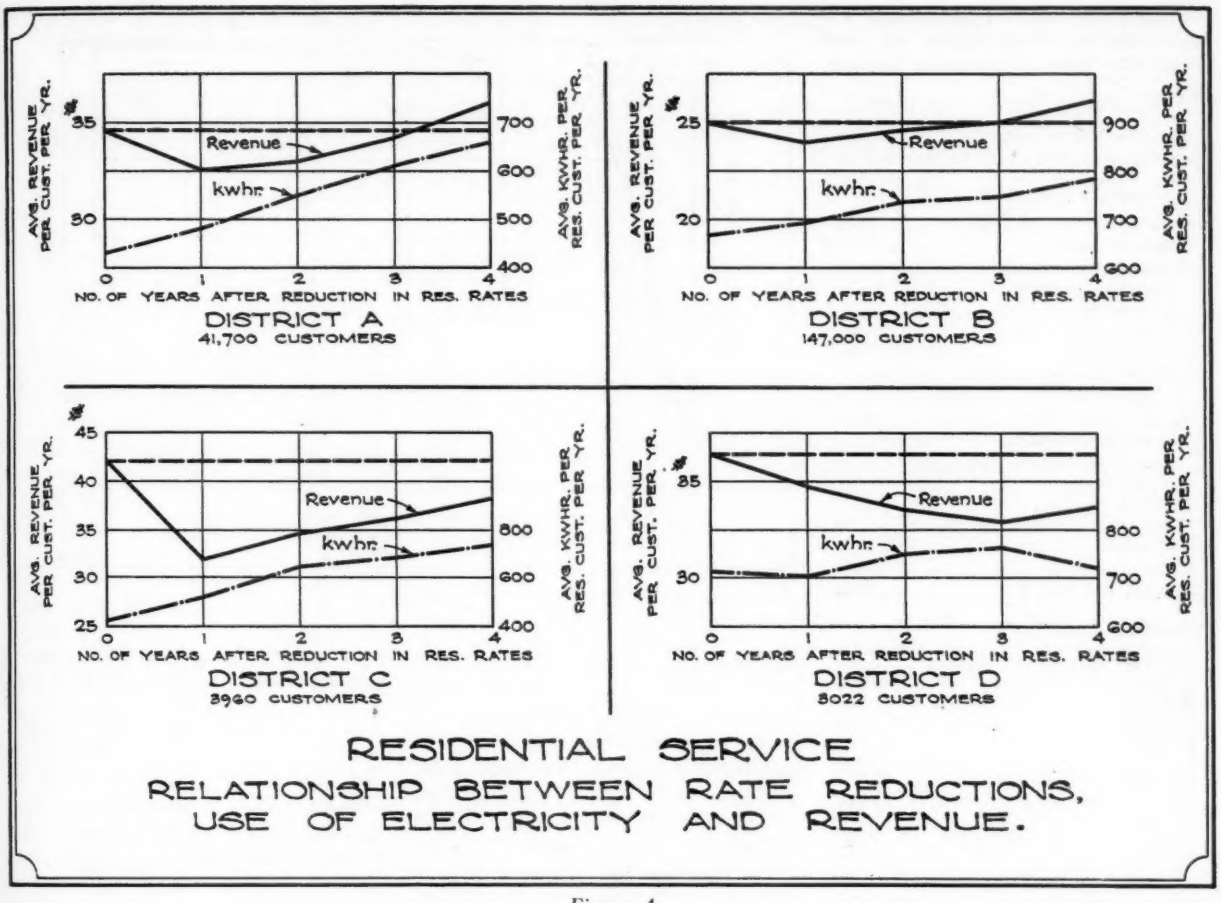


Figure 4

study of the relative price levels of gas, oil, coal and electricity, the competition to be encountered, the number of appliances already in use, and the purchasing power of the consumers.

Relationship Between Price and Use

A review of the load curves for various communities preceding and following rate reductions does not disclose a uniform law governing the relationship between price and consumption. Records of certain companies show that the immediate loss of revenue per residential customer, resulting from rate reductions, has varied from a negligible amount to a large percentage of the revenue obtained before the rates were reduced. For instance, it may be seen on Fig. 4 that in District C, comprising 3,960 customers, the loss of revenue for the year following a reduction in residential rates was about 26%. In the case of District D, comprising 3,022 customers, a decrease in use of electricity followed the reduction in rates.

The period of time which elapsed until the revenue was restored to normal has varied from a few months to more than three years. In some instances, such as in Districts C and D of Fig. 4, the revenue has never reached the level it had attained before rate reductions were made. Although the results shown in this table were undoubtedly affected by the prevailing industrial depression, they serve to show that rate reductions do not always increase consumption so that normal revenue is maintained.

Influence of Competitive Fuels

Communities in Ontario, Canada, served by the Hydro Electric Power Commission have enjoyed low domestic rates for a number of years. Yet in some representative towns, such as Simcoe and Leamington, it is found that the average monthly use of electricity by residence customers has never been greater than about 80 kwhr per customer and in other towns of similar size, such as Mimico and Preston, the consumption per customer has been double that amount.

An analysis of the cause of the large difference in use in the Ontario towns of Simcoe and Leamington as compared with that of Mimico and Preston shows that gas competition in Simcoe and Leamington has practically prevented the use of electricity for cooking and water heating. These towns have undoubtedly reached the saturation point in the use of electricity and average consumption will remain approximately constant except for a slight increase which may be effected by the increased use of small appliances and lighting. In other communities where conditions are favorable for the use of electricity for cooking, a further reduction in rates will not increase consumption because of the limited purchasing power of the consumers.

The relative large use of electricity by residential customers in such places as Tacoma and Seattle in the United States, and Ottawa and Winnipeg in Canada, is due to the favorable relation between the cost of electricity and the price and availability of fuels for residential cooking and hot water heating.

Table II strikingly shows the influence on average domestic consumption of electricity in 1935 by comparing the consumption in areas in which the com-

petition from coal, oil and gas is less keen with the consumption in areas where these fuels are abundant and low in price.

TABLE II—AVERAGE ANNUAL USE PER RESIDENTIAL CONSUMER—1935 KILOWATTHOURS

Less Competive Fuel Areas

Ontario Hydro Commission		1720*
Ottawa (municipal)		3912*
Winnipeg (municipal)		
Lighting (100% of customers)	657	
Cooking (62% of customers)	2123	4616
Water Heating (49% of customers)	5410	
Seattle (municipal)		1050*
Tacoma (municipal)		
Excluding house heating—1250		1346*
House heating	6900	
Spokane (private)		1727*
Washington State		1172
Oregon		1122
Idaho		1220
Niagara Falls, N. Y.		1842

Competitive Fuel Area

Los Angeles, Cal. (municipal)	575*
California	728
Ponca City, Okla. (municipal)	530*
Oklahoma	634
Buffalo, N. Y.	883
Arkansas	583
Louisiana	541
Texas	658

*For year 1934

It is in the interest of every electric light and power company to foster and promote lower rates for electricity as rapidly as the economics of the business will permit. Rate reductions, however, must proceed in harmony with the progress of sales programs and with the development of new uses to bring about corresponding increases in the household use of electricity. The time element is an important consideration, for it takes time to develop and obtain acceptance of new appliances, to educate customers in new or further uses for electricity, and for them to acquire the necessary wiring and appliances. Even so, there are factors which place a limit on the extent to which low rates can economically be made available.

The potential market for increasing the consumption in the home lies almost entirely in the fields of refrigeration, cooking, water heating and house heating. The factors controlling the acquisition of this market are purely economic.

Purchasing Power of Consumers

Not only is the price and availability of other forms of fuel an important consideration, but the relation between the purchasing power of the consumers and the cost of the appliances which provide these services is also of prime importance. The electric utility industry has always maintained a progressive position in developing the use of electricity in homes, but the potential customers must first be persuaded to discard the present gas, oil, wood or coal-consuming appliances, in order that some of their expenditure for these fuels, to which they are now committed, may be replaced with an expenditure for electricity. In order that a customer may use electricity for refrigeration, cooking and water heating, it may be necessary for him to purchase these appliances at a cost of between $300 and $400 and discard the appliances which have been serving his needs for some time. Some groups are very conservative and slow to accept new uses for electricity.

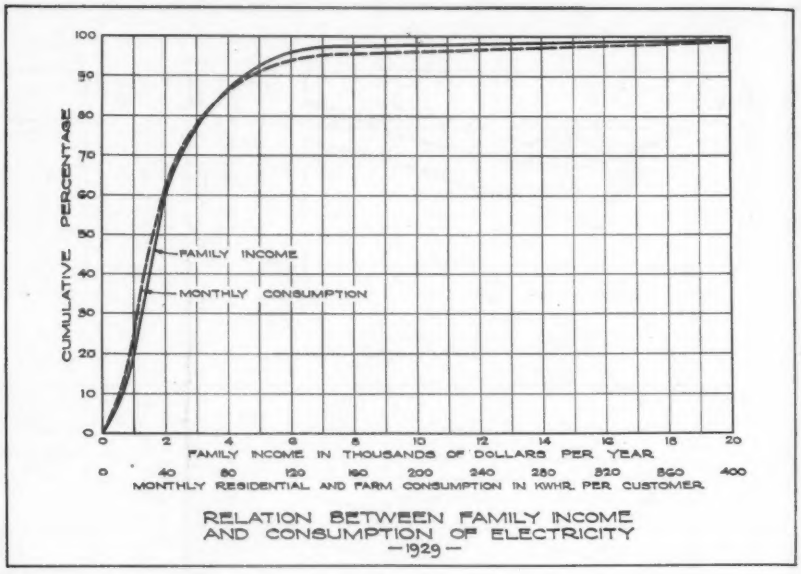


Figure 5

According to the publication issued by the Institute of Economics of the Brookings Institute entitled "America's Capacity to Consume," nearly one-half of the families in the United States have incomes of less than $125 a month. The first cost of the appliances for refrigeration, cooking and water heating, including installation costs, amounts to several months' income for the average family.

Information with regard to family income and residential consumption of electricity in the U. S. are shown in chart form in Fig. 5. It may be noted that the relative distribution of family income and consumption of electricity bear a striking resemblance to each other.

New and More Diversified Use of Existing Investment the Chief Hope for Lower Costs and Rates

There has been a great deal of discussion about ways and means of reducing the cost of distribution of electricity. The elements of which transmission and distribution systems are composed, such as lines, transformers, substations and the like, are the result of many years of study and experience. Progress is continually being made, but it does not now appear that any revolutionary discoveries are in sight which will materially reduce distribution costs. On the contrary, the exacting demands for continuity of service and constant voltage, and the increasing demands on the part of municipalities that distributing lines be put underground or that they be moved in advance of municipal building activities, are more likely to increase distribution costs.

The greatest hope for lower cost of electricity to all classes of customers lies in increased use of existing facilities. All those items of cost which depend upon number of customers, such as meters, service connections and, to a large extent, distribution lines, are more or less fixed and only increased consumption by these customers will reduce the unit costs of the electricity supplied. Better load factor brought about by better diversity of power loads will reduce the fixed charges per unit made necessary by the capacity required to serve them. In new and more diversified use of existing investment lies the chief hope for lower costs and still lower rates.

Hidden Costs At Muscle Shoals

For Every Kilowatthour Sold by TVA in the 1935 Fiscal Year, the Taxpayers of the United States Donated a Cent and a Half—Sins of the Fathers to be Amortized by the Children of the Third and Fourth Generation

By William M. Carpenter
Economist, Edison Electric Institute

FEDERAL government operation has one great advantage over private enterprise in one very important respect: interest on the investment is ignored in its published accounts.

When a power company builds a dam, it usually has to borrow money to finance it. Bonds are sold and interest is paid as the individual coupons are presented. Until the plant begins operation, the interest which has accrued during construction is commonly added, along with other "overhead" items, to actual construction expenditures and constitutes an integral part of the investment upon which the project is expected to yield a return. After the plant goes into operation, interest must be provided out of the revenues of the enterprise, otherwise there ensues the entrance of the sheriff or else a "composition" under 77B. Being still in the horse and buggy days of accounting, the borrowing of more money in order to pay interest is still frowned upon in the more old-fashioned circles.

As practiced in Government finance, all this is outmoded and the "yardsticks" of integrity and correct accounting so far laid down for the guidance of the power companies show how things ought to be done. Regardless of the fact that bonds have been sold, the cost of a Government enterprise, as such cost is reckoned by the Government, only represents the actual out-of-pocket payments for the job. Interest on any specific project disappears into that convenient catch-all entitled "Interest on the Public Debt"; an item of the Federal budget that totaled $820,926,353 for the last published fiscal year.[1] This item alone is greater than the entire cost of the Federal Government for any year prior to 1917. This is very convenient for several Government operations, in that it permits them to give out reports showing operating profits, while fixed charges are buried among the vast general expenditures of the Treasury Department.

The Treasury Pays Not Only Interest, But Interest on Interest

But interest is not so simple as it seems. Under the system of financing deficits by borrowing more money, additional bonds have to be sold to pay interest on money already borrowed. This results in still more interest. This fact is never mentioned and the Government's accounting ignores this very real element of cost. As pointed out by the author last year in connection with the finances of the British "Grid" system of integrated electricity, where much of the same sort of thing is going on, the capitalized deficits of earlier years quickly involve the enterprise in a steeple-chase with compound interest.[2]

What a merry marathon has been going on in the Tennessee Valley and how many laps in the lead compound interest has gained may be seen from an analysis of the finances of Wilson Dam —otherwise known as Muscle Shoals.

Wilson Dam—Construction Period

Preliminary studies of plans, etc., for Wilson Dam were begun in the fiscal year (ending June 30) 1918. The construction of camp, roads, railroads and coffer works, together with the purchase of equipment and supplies, was started in the summer of 1918 and was well under way when work was suspended by order of the War Industries Board on August 21, 1918, and was not resumed until November 9, 1918. Construction of operations on the lock and dam and power house were continued until about April 15, 1921, when, due to shortage of funds, work was gradually shut down and on June 30, 1921, it was practically on a maintenance basis. Work was fully resumed on October 1, 1922, and the project practically completed during the summer of 1925, at which time it began to produce electricity which was sold under short-term contracts to the Alabama Power Company.

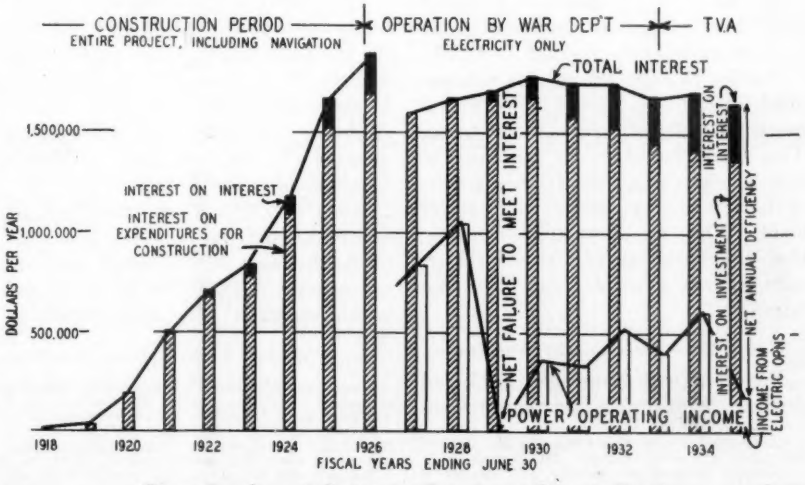


Chart 1—Annual Outgo for Interest at Muscle Shoals

Note: The principal on which this interest is based is steadily growing, as is seen from Chart 2 Due to the fact that average rate of interest on Federal borrowings has decreased (from about 3.9 per cent in 1930 to 3.0 per cent in 1935) the annual interest charges are showing a slight decline.

[1] Annual Report of the Secretary of the Treasury, 1935, p. 326.

[2] Notes on the Finances of the British "Grid", EDISON ELECTRIC INSTITUTE BULLETIN, October, 1934, p. 340.

During all this period, interest was accumulating at the rate of 4¼ per cent. This was described to the Senate as "the rate of interest paid by the United States on the major portion of its war loans and, the cost of the dam having been met from funds provided by such loans, it is evident that interest actually paid by the United States during the construction period is as much an item of cost to the United States as is the actual cost of construction and equipment."[3]

To June 30, 1926, simple interest on construction expenditures totaled $6,470,178 and interest on this interest[4] was $549,998; making a total of $7,020,176. This must be added to the actual net construction costs, shown in the 1926 report of the Chief of Engineers, U. S. Army, as follows:[5]

New work	$45,204,627
Maintenance, due to cessation of work	359,593
	45,564,220
Credits: receipts from sales of materials and power	1,816,919
Net total expended to June 30, 1926	43,747,301

During this period, the author has computed that:

Interest paid out by Treasury Department	7,020,176
Total taxpayers' investment, June 30, 1926.....	$50,767,477

At this point, a division of capital costs between power and navigation must be made in the ratio of 37 to 10.[6]

Applied to expenditures plus accumulated interest, this gives $39,965,884 to power and $10,801,593 to navigation. This figure for electricity becomes the base for calculating the further deficits of Government operation as a power plant. When the allowance for navigation is similarly carried forward, the results are quite startling—as will be seen later on.

Wilson Dam—Operation by War Dept.

Beginning with September, 1925, and pending the final determination by Congress of the disposition of the Muscle Shoals properties, Wilson Dam was intermittently operated under an arrangement with the Alabama Power Company. This provided for the use by the Power Company of water power from the Government dam in lieu of generating power in its own steam plants when the demand on its interconnected system required a supply of energy in excess of its own hydroelectric output. Due, it may be suspected, to political jealousies and to the vigilance of those ever upon their guard against the encroachment of private upon public enterprise, this arrangement was revocable on thirty days' notice, and this fact precluded a contract for a definite long-term period which would have carried a much better price for the government. Under the existing plan, the operation of Muscle Shoals was not continuous. For about half of the time there was either an entire or partial suspension of operation. Also, because of the necessary terms of the arrangement, there were frequent periods when the Company was unable to use all the power which was available at that instant at the Dam. As it was, there was not a single year when power revenues even approximated the interest upon the taxpayers' investment in the electric operations of Muscle Shoals.

During the period from September 1925 to May 31, 1933, when this arrangement was in force, Muscle Shoals generated 2,358,000,000 kwhr and the Government received $4,978,000.[7] During the same period, operation and maintenance applicable to electricity approximated $1,350,000[8] while accumulated interest rolled up $12,250,000.

On September 1, 1933, on which day the physical transfer of the properties at Muscle Shoals was made by the War Department to the Tennessee Valley Authority, the taxpayers' total investment in the electrical part of Muscle Shoals stood at $51,279,588.

None of this analysis takes into account the deficits accruing from the Sheffield Steam Plant, which cost approximately $12,000,000 to build and which remained in standby condition since its succesful test run of two weeks ending January 25, 1919. The author frankly admits that such calculations are beyond him, but if some persevering and ingenious student could successfully find his way through nitrates, fertilizer, national defense and compound interest, a further item would be added to the taxpayers' investment in the electrical properties of the Tennessee Valley and last year's deficit correspondingly increased.

Operations by the TVA

At the time the TVA inherited Muscle Shoals, the investment applicable to electricity was thus $51,279,588, of which $37,000,000 constituted actual construction expenditures and $14,279,500 was the accumulated interest less operating income from the day-to-day sale of power to the Alabama Power Company.

Subsequent operations are matters of public record and are found on page 66 of the Annual Report of the TVA for 1935 with the important and significant exception that no charges for interest, amortization or depreciation are made. Further calculations as to the taxpayers' present investment are shown as follows:

	Fiscal Years Ending June 30, 1934	1935
1. Investment at beginning of year	$51,279,588	$53,995,607
2. Expenditure for plant & equipment (a)	1,874,319	1,984,329
3. Interest rate (b)	3.25%	3.00%
4. Interest on Item 1	1,388,823 (d)	1,619,868
5. Interest on Item 2 (c)	25,382	29,765
Total Interest	$ 1,414,205	$ 1,649,633
Credit: power operating income (e)	572,505	183,935
Net deficit for the year	$ 871,700	$ 1,465,698
Investment at end of year..	$53,995,607	$57,445,634

(a) "Net investment in programs: Electricity (plant and equipment)" Supporting Statement No. 2-B.
(b) Average rate paid on Government funds during year.
(c) Computed on half of expenditure
(d) Ten months only.
(e) "Total reserve, for amortization, construction, interest and other purposes"—Supporting Statement No. 2-A.

1935 Deficit Equivalent to 1½ Cents for Every Kwhr Sold

The above table by no means covers all the cost to the taxpayer. There are, in addition, the charges incurred by the Treasury Department in procuring the funds which are spent on the project, and the expense of the accounting services rendered by the Comptroller General's office. No allowance has been made

[3] Analysis of Muscle Shoals Bids; by Mr. Deneen, Sen. Doc. 131 69th Congress, 1st Session, p. 5.
[4] Interest compounded annually. If interest is compounded semi-annually or quarterly the total is somewhat larger.
[5] Report, Chief of Engineers, U. S. A., 1926, p. 1140.
[6] Veto message of President Hoover, March 3, 1931, of the Norris Bill, S. J. Res. 49, in which he assigned 37 out of the 47 million actual construction expenditures to power and 10 to navigation.

[7] O. G. Thurlow; E.E.I. BULLETIN, June, 1935, p. 202.
[8] Total expenditures for maintenance, operation and repair from April 1, 1926, to August 15, 1933, amounted to $1,711,941 as shown on page 911 of the Report of Chief of Engineers of the U. S. Army for 1934. This sum has been divided between power and navigation in the ratio of 37 to 10.
Students may find the annual revenues from sale of power itemized each fiscal year from 1927 to 1934 in the Annual Reports of the Secretary of Treasury (also shown in the Statistical Abstract of the U. S.). The 1926 revenues were combined with sale of surplus materials and are not so itemized. Annual expenditures for operation and maintenance appear in the reports of the Chief of Engineers.

for depreciation on a property which has already been in operation for ten years. No consideration has been given to sinking funds or to the amortization of the original investment. These latter are charges upon our children; when, if and as the country ever returns to the condition of a balanced budget.

Nevertheless, a deficit of $1,465,698 is sufficiently impressive to negative all claims of the TVA as a "going concern." In 1935 a total of 100,681,142 kwhrs were sold from Wilson Dam.[9] Divided into $1,465,698, this gives 1.45 cents for every kwhr sold and constitutes the bonus given by the taxpayers of the United States toward the furtherance of the TVA in that year.

During the fiscal year 1935, the following sales of power were made by the TVA:

	Kwhr	Revenues	Average per Kwhr
Municipalities	12,814,300	$74,013	0.58¢
County power associations	4,251,300	24,574	0.58¢

Source: Annual Report of TVA for 1935, p. 29.

Instead of a price of 0.58 cents per kwhr, the actual cost of power sold to these municipalities and county power associations was 0.58 plus 1.45, or 2.03 cents; and this without any consideration of depreciation.

By the time this electricity arrives at the premises of the ultimate consumer, the bonus of 1.45 cents is increased still further because, for every kwhr finally sold by the municipalities, a certain additional number are lost and unaccounted for. Assuming for want of more detailed information, a figure of 12½ per cent for losses, etc., on the local distribution systems, the bonus to the ultimate consumer becomes 1.66 cents per kwhr actually purchased by him.

The average price of domestic electric service in the places served by TVA power during the year ended June 30, 1935, was approximately 2.40 cents. The contribution of the rest of the country was 1.66 cents—making a total of 4.06 cents per kwhr. The average price received per kwhr sold to all consumers in the places served by TVA power during the year ended June 30, 1935, was approximately 2.09 cents. Adding to this the contribution of 1.66 cents made by the rest of the country, the total becomes 3.75 cents. This is 46 per cent higher than the 2.57 cents which represents the average revenue received from the sale of electricity to all ultimate consumers by all the power enterprises of the United States during the 12 months ended June 30, 1935.

A Word About Navigation

"Navigation" as practiced in the United States is, perhaps, the most cruel hoax of all. It is the least self-sustaining of any Government enterprise and most of the "improvements to navigation" constitute little more than political rewards to favored communities. The situation at Muscle Shoals is typical.

Distributed in the ratio of 10 to 37, the total sum of construction expenditures and accrued interest at the end of the fiscal year 1926 was $10,801,593. Taking this same ratio for the expenditures for operation and maintenance during the period since navigation began, the taxpayers' total investment in navigation facilities on June 30, 1933 was $14,387,360. During the seven years 1927 to 1933, operation and maintenance cost about $350,000, while accrued interest totalled $3,225,000, a total expense to the taxpayer of $3,575,000. *This expense was four times the total value of all the traffic through the locks during that period.*[10]

[9] Annual Report of the TVA, 1935, p. 29.

[10] Traffic through Lock 2, Wilson Dam, is stated on page 609 of part II of the 1934 Report of the Chief of Engineers, U. S. Army as follows:

Year	Tons	Value	
1927	3,719	$23,537	(7 months; opened June 1, 1927)
1928	4,504	26,327	
1929	4,648	71,500	
1930	2,852	20,047	
1931	1,104	30,920	
1932	1,512	15,902	
1933	223,209	693,196	(of which 71,363 tons were sand and 116,105 gravel.)

(*Continued on page* 314)

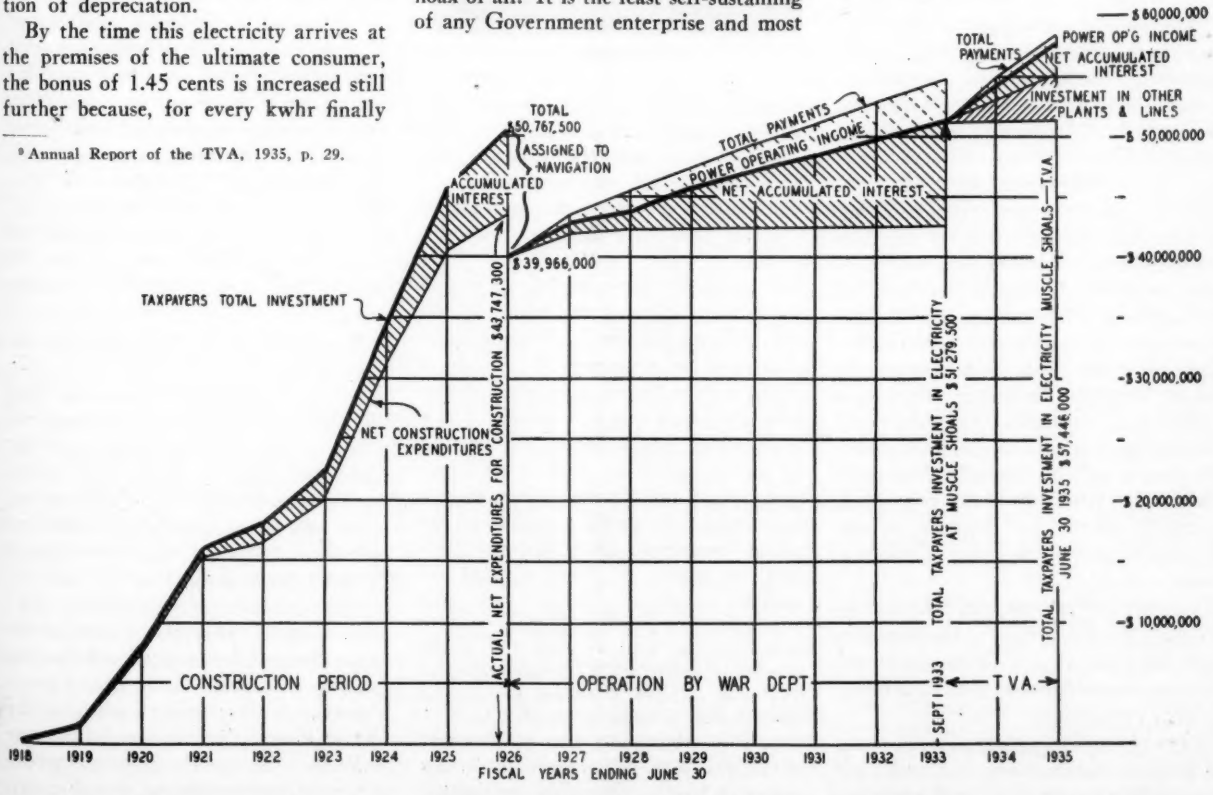

$ 60,000,000
TOTAL PAYMENTS
POWER OP'G INCOME
NET ACCUMULATED INTEREST
INVESTMENT IN OTHER PLANTS & LINES
$ 50,000,000
TOTAL $50,767,500
ASSIGNED TO NAVIGATION
ACCUMULATED INTEREST
TOTAL PAYMENTS
POWER OPERATING INCOME
NET ACCUMULATED INTEREST
$ 39,966,000
$ 40,000,000
TAXPAYERS TOTAL INVESTMENT
NET CONSTRUCTION EXPENDITURES
ACTUAL NET EXPENDITURES FOR CONSTRUCTION $43,747,300
TOTAL TAXPAYERS INVESTMENT IN ELECTRICITY AT MUSCLE SHOALS $ 51,279,500
TOTAL TAXPAYERS INVESTMENT IN ELECTRICITY MUSCLE SHOALS—TVA. JUNE 30 1935 $ 57,446,000
$ 30,000,000
$ 20,000,000
$ 10,000,000
CONSTRUCTION PERIOD
OPERATION BY WAR DEPT
SEPT 1 1933
T V A.
1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935
FISCAL YEARS ENDING JUNE 30

Chart 2—Taxpayers' total cumulative investment in electric facilities—Muscle Shoals TVA—at the end of each year.

Aboriginal Cost

By H. L. Gruehn

Assistant Secretary and Assistant Treasurer, Consolidated Gas, Electric Light and Power Company, Baltimore, Maryland

An Address before the Fourth General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 1, 1936

IT has been said that the task of accounting is to record facts. Of course, accounting is a great deal more than that; among other functions, it is the task of accounting to interpret what has happened so as to furnish a basis from which judgments as to the future may be formed. Post-mortem accounting may be in itself useful, but for the investor who must form his judgment as to the future ability of an enterprise to repay capital advanced to it, and to the management charged with the task of conducting an enterprise efficiently, and to the regulatory body charged with the task preserving equity between the public and the investor, it is necessary that the accounting mechanism provide an accurate and revealing portrayal of the affairs of that enterprise.

Because the accounting system must furnish the material upon which managements, investors, and regulatory authorities must base their judgments, the methods of accounting and the principles followed in the process of accounting are, therefore, quite important.

What makes the matter of accounting of more than passing interest at this time are the current efforts of regulatory representatives to develop a new body of principles for utility accounting. If these principles are sound and constructive, then not only will managements be helped but also investors, regulatory bodies, and ultimately, the public. If the principles so developed are not sound, then harm will be done. If these principles are positively fallacious, then strenuous efforts are required on our part to correct them before damage is done.

Capable accountants of the utility industry feel that certain of the principles now being proposed are definitely wrong in their conception, and will be harmful in their application.

One of the outstanding characteristics of a utility balance sheet is that 80 per cent to 90 per cent of its total assets are

MR. GRUEHN

represented by the utility's physical property—its so-called Fixed Capital. Any principle prescribed for the accounting for Fixed Capital which is unsound is of surpassing importance to the credit of a utility and its ability to raise new capital.

It is another characteristic of typical utility balance sheets that about 50 per cent of the capitalization is in the form of bonds and the remaining 50 per cent is in the form of equity; consequently, any principle which may cast doubt upon a large portion of the dollars representing 80 per cent to 90 per cent of a utility's total assets, thereby casts considerable doubt upon the credit standing of the equity investment. Any harmful principle in respect to Fixed Capital accounting therefore is of surpassing importance to security holders and to managements; and because the public benefits or is harmed by the soundness of its public utilities, it should likewise be interested in unsound principles.

So it is of interest that an unsound principle is now being proposed in this matter of how to record on our balance sheets a group of assets which constitute 80 per cent to 90 per cent of a typical utility's total assets. This is the principle which is officially called "original cost," and which has been facetiously, though accurately, called the principle of "aboriginal cost."

For the purposes of accounting, this principle is a most amazing doctrine. It proposes that we shall take 80 per cent to 90 per cent of our total assets and deliberately misstate them, and that we shall also deliberately deprive ourselves after the passage of a few years from being able to ascertain exactly what they cost us. It proposes that we shall replace our present balance sheet data with figures which are neither "cost" nor "value." It proposes that we reflect on our books of today what, from the viewpoint of hindsight, is estimated to have been or what should have been done by enterprises in whose mistakes we are never interested or responsible, and for whose successes we had, under our system of economic enterprise to pay. The principle of "aboriginal cost" proposes that the balance sheet data developed under the accounting principles laid down by Commissions and followed by utilities for twenty-five years be misstated.

Now, what is this principle of "aboriginal cost?"

It says, first, that we determine what was the cost of each item in actual use today to the enterprise which first devoted that item of property to the public service, even though that be one hundred years ago. The aggregate of these so-called "original costs" shall be designated "Fixed Capital in Service."

The principle of "aboriginal cost" says, secondly, that the difference between the book value today and the costs to our predecessors shall be placed under a separate heading under some term like "Fixed Capital Acquisition Adjustment Account." So far the principle would only require a meaningless, though costly,

segregation of our present Fixed Capital accounts with the unfortunate result that some part of our present Fixed Capital accounts would be designated by a term which of itself seems to cast doubt upon its legitimacy.

But the principle of "aboriginal cost" goes further. The current proposals of the Federal Power Commission and the National Association of Railroad and Utilities Commissioners accountants provide that we ascertain what should have been accumulated in our Retirement Reserves if our predecessors and we had followed a certain concept of depreciation accounting. It requires that our Retirement Reserves be increased accordingly, and the difference between what our predecessors and we should have accumulated by following a theory which we do not believe is correct, and what is now in our Reserves, shall likewise be added to the so-called "Fixed Capital Acquisition Adjustment Account."

The result of the proposal is that our Fixed Capital balance sheet values—which are 80 per cent to 90 per cent of our total assets—be restated: that is to say, they shall be written up in some cases and written down in others. As a result of this restatement, one part of our Fixed Capital balance sheet figures shall show an estimated amount of what the property cost our predecessors, and the other part shall show the deficit in the past accrued depreciation if retroactively calculated upon a theory which we believe to be unsound, plus or minus the difference between our predecessors' costs and our own costs.

The first part of our Fixed Capital accounts is to be labeled "Fixed Capital in Service," which is a term generally understood; and retirements of "Fixed Capital in Service" may be made against our Retirement Reserves. The second part of our Fixed Capital accounts by its title suggests an item of doubtful value and is to be charged off as the Commissioners may direct. It may be interesting to observe that adequate accounting provision is made for charging this sum off to Surplus, if the Commissions should so direct. The unusual spectacle is thus presented whereby an accounting classification provides the machinery for handling a confiscation of a part of our property if the Commission should so direct.

Now a few comments may be in order to show the amazing character of this proposal of "aboriginal cost."

If we bought a property at a price approved by the Public Service Commission, or at a price fixed by the Courts in bankruptcy proceedings, we may feel entitled to believe that its cost is properly to be recorded on our balance sheets as the book value (i.e. "cost") of that purchase, but under the principle of "aboriginal cost" that is not so. If the "original cost" of the property to the selling company or to its predecessors, minus the accruals for depreciation as defined by the proposed classifications, is different from our purchase price then we can not place the purchase price upon our balance sheet as the book value of our purchase.

If, in what might be considered as an exaggerated example, the land owned by the company being purchased is demonstrably worth several times its "original cost" to the first utility, we must place all excess under a dubious caption called "Fixed Capital Acquisition Adjustment Account." I say this might be considered an exaggerated case, but it has actually happened. The fact that the owners may not have been willing to sell for the cost to a predecessor but were so mercenary as to expect the current market value of their land is apparently quite irrelevant.

Another comment is that "aboriginal cost" operates on the principle of hindsight. It demands to know, for instance, what should have been set aside for depreciation by a predecessor during its career, if it had known of the particular theory of depreciation as outlined by the proposed classifications—and had agreed to it. It overlooks the fact that a predecessor may by costly experiment have had to balance losses on some types of property with gains on the specific property turned over to the purchaser. "Aboriginal cost" is interested only in the "original cost" of the specific property remaining today, and it is not interested in the unfortunate business fact that not every item of property is a "winner" and in the unfortunate business fact that a seller has a right to expect the fair market value of his assets. Parenthetically, it may be observed that the use of average lives based only upon the surviving units of property, for the purpose of calculating what should be in the Retirement Reserves today, involves a demonstrable mathematical error. The theory of "aboriginal cost" also assumes the knowledge of hindsight in expecting that the original owner knew at the time he installed an item of property just how long it would last.

Still another comment is that the principle of "aboriginal cost" blithely overlooks the inability of present day owners to determine costs to a predecessor, and it overcomes that difficulty by requiring that such "original costs" be estimated when they cannot be ascertained. Surely, it does not seem proper to require that a large part of 80 per cent to 90 per cent of our total assets be placed upon our books at estimated figures, which are predicated upon the transactions of predecessors in whom we had no interest or no responsibility.

The principle of "aboriginal cost" overlooks the reality that the predecessor may not have been willing to sell at a figure of "original cost" less depreciation calculated upon what is believed to be an unsound theory, and the application of which additionally involves a mathematically demonstrable error.

Finally, the principle of "aboriginal cost" quite destroys, after several years of its operation, the ability of a utility o ascertain the costs of its property to the present owners.

What is the purpose of this theory of "aboriginal cost?"

As explained by its proponents, these maneuvers are necessary "to obtain important information as an aid to regulation and in order to lay a basis for the compilation of valuable statistical data." They believe the Supreme Court has said that "original cost" is a factor in fixing valuation for rate-making purposes—and so they say, "let us get 'original cost'." They admit that "cost to the accounting company" is also a factor in fixing rate-making valuations, and so they say, "let us get that too."

Let us assume, as I think we should, that this reasoning is sincere. Several obvious fallacies quickly suggest themselves.

1. The Supreme Court has never defined "original cost" as these proposed classifications define it. The question of whose cost will be termed the "original cost" for rate-making purposes can not be announced by any such dogmatic rule—at least not so far as the findings of the Supreme Court are concerned.
2. The Supreme Court has never said that hypothetical deficits in past accrued depreciation must be recorded on our balance sheets, and surely has never said that the theory of depreciation as described in the proposed classifications shall be used as a basis for stating Fixed Capital on balance sheets.
3. The Supreme Court has never said that "original cost" (which it never defined as here proposed) is the only datum in determining value—but on the contrary, has said that many other factors must

> be considered. The famous language of Smyth vs. Ames is that in order to ascertain fair value "the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stocks, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration and are to be given such weight as may be just and right in each case."

May I then ask the proponents of the principle of "aboriginal cost"—"what will you achieve?" Even if the principles as outlined are followed, the results do not meet the definition of the Supreme Court as to "original cost." Where has it so defined it?

Even if the principle of "aboriginal cost" is followed, and even if the Supreme Court had so defined "original cost," the result would not be the only datum required for valuation proceedings. Cost to the accounting company, reproduction cost, and so forth, are also to be considered.

Where then is the justification for such a procedure?

One thing it will do—the proposed "original cost" principles will destroy the ability of a utility to ascertain cost to the accounting company. I made this plain and attempted to demonstrate it in hearings before accountants of the Federal and State regulatory bodies in Washington last April, and the claim was not controverted; and I stand ready to prove that cost to the accounting company can not be maintained under the proposed procedures of "aboriginal cost" accounting. Yet the datum of "cost to the accounting company" is also important in a rate-making or other valuation, and assuredly it is important to the security holder who furnishes the capital, and certainly it is important to the management charged with doing an efficient job of conducting utility enterprises.

May I, with the sincerest of motives, suggest that some rudimentary thinking be done concerning the fundamentals of the problem? Let me offer the approach that cost is something quite different from value.

Valuation, for rate-making or other purposes, is a process which involves many factors of which cost to the accounting company is but one. The basis for rate-making has been described in classic language as the present fair value of the property employed for the public convenience. That fair value may be quite different from its cost to the present owner; it may be quite different from its cost to a predecessor owner. Value is inherent in the property whether the balance sheet reflects present value or not. Valuation must result from a consideration of data quite beyond costs or book values. The Supreme Court has so stated. Yet even the current proposals for "aboriginal cost" do not contemplate that we keep on our books the information to record such other factors as reproduction cost, and the like.

The same set of principles applies to the treatment of depreciation. In determining the depreciated value of a property, the Supreme Court has been quite clear on that point. In rate cases the Supreme Court has said in clear language that the testimony given by competent experts who examined the property and made observations as to the depreciated condition was preferable to averages based on assumed probabilities. For valuations, therefore, the particular applicable facts as observed are paramount, and not a hypothetical calculation based upon assumed probabilities. For the purpose of a balanced sheet, however, the significant data are the appropriations actually set aside minus the actual retirements charged against these appropriations. It can not be repeated too forcefully that the data for determining value are not necessarily the same data as are properly to be recorded on the books of an enterprise, and that an attempt to confuse the two can not be else but harmful.

Cost to the accounting company, which is the essential component of the accounting process is but one datum in this matter. Cost to the accounting company is not necessarily equivalent to present fair value or to other guides to present value, e.g., reproduction cost new, capitalization of earnings, or scrap value.

Let me attempt to illustrate this point with an example.

The proponents of the "aboriginal cost" theory probably asked themselves the legitimate question: "Why should rates be charged because of a change in ownership? Why should rates be based upon the amount which a new owner is willing to pay, asuming he pays more than the original owner did?" The answer is that rates should not be changed because of a change in ownership, or merely because a new owner was willing to pay more than cost to the old owner; in fact, rates do not change on this account. The present value of a property is inherent in the property as of a given moment, whether the property is sold or not. If the present value should exceed book values, then the owner is entitled to charge rates for service which will yield a fair return on that fair value. This is so whether a property is sold or not.

If a purchaser paid more than book values and more than the property is actually worth, the purchaser would only be entitled to charge rates based upon actual value, and not upon his purchase price. In fact, do not our Commissions often say specifically, when passing upon an application to buy another utility property, that their approval of the purchase is not to be construed as determining the value of the property for rate-making purposes?

Surely, this distinction between value and cost must be clear to the accountants of regulatory bodies. If it is clear, how can they justify the proposals of "aboriginal cost," which attempt to confuse the two concepts?

So, whether by design or by honest error, the proposal of "aboriginal cost" definitely confuses value with cost. The confusion has the unfortunate but important by-products of requiring a misstatement of the balance sheet values for 80 per cent to 90 per cent of a utility's total assets (and even an honest misstatement is a costly procedure under the Acts administered by the Securities and Exchange Commission); of requiring utilities to reflect on their balance sheets neither cost nor value; of requiring them to make a retroactive recording of a hypothetically calculated depreciation reserve; of casting doubt upon the legitimacy of a considerable fraction of our Fixed Capital accounts; and of destroying the ability of the utility to obtain the cost to the accounting company, which is so essential to investors and managements, as well as to regulatory bodies. The proposal contemplates a confiscatory proceeding in providing that the so-called "Fixed Capital Acquisition Adjustment Account" may, at the direction of Commissions, be charged off to Surplus. The proposal may even stand guilty of the accusation that a chipping-away of legitimate values may be easier if confusion is introduced into the methods of accounting for 80 per cent to 90 per cent of a utility's assets.

Continuing Inventories

By H. B. Gear

Vice-President in Charge of Operating and Engineering,
Commonwealth Edison Company, Chicago, Ill.

A Discussion before the First General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 1, 1936

THOSE who have been through the process of making a physical inventory of a utility property, are usually left with a distinct impression that if the disturbance caused in the regular work by such a process could be avoided by the establishment of a continuing inventory, it would be worth while to assume the burden of expense entailed thereby.

Such plans have sometimes gotten a start but in many cases have died when the cost of it was known. This resulted from the idea that such an inventory must be on the basis followed in a mercantile business where every minor item is completely recorded. Under such a conception every detail of a switchboard or of an overhead line must be itemized. The work involved in getting a supposedly accurate inventory of the last 10 per cent of the property is entirely disproportionate to that required for the other 90 per cent.

While the futility of such refinements has long been recognized by both utility company and utility commission personnel, it is but recently that any commission has formulated procedures which make possible a continuing inventory on a practical and workable basis. The New York and New Hampshire utility commissions have made it the duty of each utility company to set up an inventory of its property and to keep it in continuing basis thereafter.

In so doing they have recognized that an inventory of utility plant can be maintained by a suitable choice of "units of property" selected by the company to suit its own needs. Each of the various sizes of such an item as line transformers, for example, is to be enumerated under the one Unit of property "Line Transformers."

"Minor items" are defined as those parts of the property which are associated with "units of property" but might be replaced separately.

Under the theory of making an inventory exact in extreme detail, it was not unusual to consume from six months to

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a year in making an inventory and appraisal of a large utility property. Under the practical theory an inventory based largely upon the operating records of the utility, together with a reproduction cost estimate, was completed for the property of Commonwealth Edison Company in about four months. The property has a value in excess of $300,000,000.

For operating, maintenance, and general purposes, the Company has long maintained records of all major equipment in generating stations and substations, maps and quantities of underground conduit, length of feeder and transmission cables, number, size, and age of poles, transformers, meters, and the like. The records of transmission and distribution items were spot checked by the engineers of the Commission, and with slight adjustments found satisfactory for use as an inventory of these parts of the property.

The company employed consulting engineers to make a reproduction cost estimate on its own behalf and these engineers found the operating inventories so nearly accurate that they did not deem it necessary to make a new inventory, except that in the case of structures, the component elements such as brick, concrete, steel and the like were computed from architects' plans.

In the case of substation buildings where there were numbers of buildings of a similar type, it was possible to determine units on a cubic foot basis by making a detailed inventory of typical buildings, which saved measurement of quantities of brick and steel in each building.

The same principle was applied to the inventory of overhead lines, service connections, transformer vaults, manholes, switchboard wiring, and other items involving many details.

The assembly of the data was of course done with the cooperation of those of the engineering and operating personnel of the Company who were familiar with its history. This resulted in neglect of other kinds of work, and the employment of temporary people to carry on both the special and regular work. The disturbance to the regular order would have been far more serious had the construction program of the Company been at a normal rate while this inventory work was in progress.

In view of these experiences, it was quite natural that a proposal to carry on the inventory on a continuing basis should be favorably considered. The matter was given intensive study in the light of current trends relative to inventories of property, with the result that it was found possible to initiate a procedure which would result in a practical record which could be set up and maintained at a reasonable cost.

There are two basic requirements of such a plan, (a) the selection of units of property for practical use and (b) a job order routine adapted to report units and the cost thereof as they are added or removed. In this case the units of property were chosen to show all major items, leaving minor items to be embodied with the major item with which they are associated. In such items as switchboards, the unit consists of the entire assembly of items without listing

the details separately. This also applies to control wiring, conduit for wiring, and bus structures.

This resulted in 10 units of property in the overhead plant, consisting for example, of poles, arm assemblies, wires, arresters, transformers, services, transmission structures, and miscellaneous.

The underground conduit and cable system has 10 units, and the electrical plant in stations and substations is comprised in 20 units. The various sizes of poles, transformers, cables, and underground conduit sections are accounted for separately under their respective units of property.

The selection of units for mechanical equipment in generating stations and for structures are being worked out, and it is likely that the total number of units of property for the entire plant of the Company will be from 75 to 80.

The job order routine is designed to coordinate the job order estimate with the report of the completed work in such manner that the estimate will be expressed in terms of units of property and the report will show the cost of installing each such unit. This report will be checked and certified by a representative of the department doing the work or supervising it, if done by contract. The engineer responsible for making the original estimate will also compare actual costs with the estimates, and certify that the cost is reasonably stated in the report.

This report then becomes the basis of additions to or removals from the inventory records of the Company, and of the fixed capital accounting records. The inventory record will be kept in the engineering department and will show quantities of units of property from month to month. The fixed capital record is maintained in the Accounting Department.

Summaries will be drawn off once or twice a year for purposes of comparison with other records.

The work of setting up the inventory sheets in suitable form for a continuing record is proceeding and will have required about 12 months' time when completed. The cost will not exceed .03 to .04 of one per cent of the plant investment.

The operating records which served as the basis of the inventory in this case, were for the most part in the form of card files of such items as converters, large transformers, line transformers, poles, meters, switchboard instruments, and automobiles. The conduit and cable records are kept on sectionalized maps. In the case of 12 kv. and 66 kv. cables, the cable lengths between manholes are recorded in card files.

These records are maintained entirely aside from any use as a statistical inventory as a means of recording date of purchase, periods of overhauling, changes in loading, date of last test, and similar facts needed for proper operating or engineering supervision. There is thus an incentive to keep such records up to date entirely independent of its use as a check on an inventory carried along as a part of the fixed property record of the company.

The assembly of the inventory required the full cooperation of engineering, operating, and accounting forces, both in the original determination of objectives and in the assembly of the data. It is to be expected that modifications will be made as experience may indicate the need of them.

It is a feature of the New York proposed classifications of accounts that replacements of minor items associated with units of property shall be treated as maintenance items unless an entire unit of property is retired. The dividing line between replacements through maintenance and replacements through retirement accounting is necessarily not so sharply defined as to be fixed by any rigid rule.

The recognition of "minor items" as suitable charges to maintenance when replaced, is a step in the direction of better definition of this sometimes hazy boundary line.

The speaker is well aware that the conditions in a metropolitan property with high concentration of investment per square mile, ready access for inspection and ease of supervision, make the problem of a continuing inventory far simpler than it is in a system covering large areas with numerous cities, villages, and cross country lines. He therefore submits this discussion for what it may suggest where the principles upon which it is based may be applicable, and in no sense as a plan which may be available for general use.

Certain other companies have made inventories in recent years each following somewhat differing lines of procedure.

Companies operating in New York State are in the process of getting themselves ready to comply with the rules of their State Commission.

There has not been sufficient time in which to reach anything approaching standardization in inventory work, either as to the general objective of a continuing inventory or as to the degree of refinement of procedure found justifiable.

The Classifications of Accounts as proposed by the National Association of Railroad and Utilities Commissioners and the Federal Power Commission include provision for continuing inventories as a required part of the records of every utility company.

The units of property constituting such inventories are set forth in detail and seem likely to leave too narrow a range of flexibility to meet the needs of the case when applied to properties of various size and geographical distribution.

The success of the establishment of a continuing inventory can be realized only as it is based upon a reasonable expense for its maintenance.

If initial procedure adopted without experience proved inadequate or superfluous after a time the cost of changes of the record already built up may be a needless expense in later years.

If regulatory bodies are convinced that a continuing inventory is ultimately to become a necessary part of the records of every utility company the requirement should initially be an optional one or should be otherwise arranged to provide for gradual introduction in order that experience may be gained before mandatory requirements are set up.

Initially the regulations should set forth general principles and objectives. Details which would interfere with the acquisition of experience in different kinds of procedures in different properties should not be included.

This issue and the preceding issue of the Bulletin contain the complete Convention addresses and papers. Since no formal proceedings of the Institute are published, it is suggested that these issues be preserved for your Convention record.

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Cost and Economic Value of Accounting Elaborations

By C. E. Kohlhepp
Vice-President and Treasurer, Wisconsin Public Service Corporation, Milwaukee, Wis.

An Address before the First General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 1, 1936

THE title of this article, intended to supplement the remarks of Messrs. Nash and Gear, is chosen deliberately. If there is any one thing that this nation needs most, it is a return to the old fashioned concept that cost should not exceed economic or useful value, whether is be of accounting, shoes, steam plants, C.W.A., P.W.A., A.A.A., or T.V.A.

Let it not be assumed that we mean to imply that all accounting elaborations are uneconomic. Much of what we are doing is fundamentally sound. In addition, considerable detail is made necessary by regulatory or taxation requirements, rather than the needs of management or investor. A suitable accounting system, matched to the size and needs of a business, throws to the surface significant facts. The cost of detail is justified if the management is materially aided in understanding the present, or charting its future course. There is very often truth in the old adage that "what you don't know won't hurt you" but in business frequently what you don't know is just what does hurt you.

Obviously, the converse is that unused or unusable accounting elaboration is absurd from an economic viewpoint. Many public speakers have several stock stories to illustrate the human propensity for doing things "because we've always done it that way." Justice Holmes once pointed out that business may find itself on an ocean of facts "plunged into a thick fog of details." Numerous industrial and commercial organizations, and perhaps utilities as well, have been seriously harmed by a sales policy rigidly geared to super-technical cost computations. We are all undoubtedly accumulating, at substantial expense, elaborations that are interesting enough but which do not pay their way.

The trouble with accounting elaborations is that we are prone to think we can handle them with little or no additional cost, just because we have an efficient, well oiled accounting machine that can easily take a little heavier load. This reasoning is as unsound as to assume that all new power loads could be sold at surplus power rates because we now have the necessary generating and distributing facilities. Sooner or later the day of reckoning arrives, additional machines are purchased, office space rented and personnel added. The law of diminishing returns fits this situation. We should refuse to recognize the "added cost" theory in connection with accounting expenses and hold firm to the principle that, generally, it is cheaper to secure elaborate data as, when, and if needed rather than as a routine operation.

MR. KOHLHEPP

In the category of accounting elaborations regulatory developments during the past several years have produced a number of suggested accounting innovations, some of them in effect, of a very costly type.

Classifications of accounts have been proposed requiring 50 per cent to 100 per cent more primary accounts than the Classification now in general use. This means a direct pro-rata increase in all basic accounting distributions, such as material and labor distribution. Each operation in the process of combining, consolidating and condensing such base data is increased in proportion to the increase in the number of accounts. Perhaps the result would not be a corresponding 50 per cent to 100 per cent increase in accounting expense. That there would be a substantial increase is undeniable.

The suggested classifications have seriously advanced the theory that separate fixed capital and operating expense accounts should be maintained for each substation and transmission line, and in addition for each political subdivision, which in most states includes townships. For companies serving far flung areas this would mean pyramiding tremendous detail at staggering cost.

Straight-line depreciation accounting, with retroactive effects, has been proposed and the required subdivision and supporting details would add another substantial item to our accounting expense which could not meet the economic value test. Accounting by micrometric devices is always futile. This proposal would require subdivision of present reserve balance and of all future debits and credits by account, which would create a multitude of overlapping and apportionment problems. Other complications would ensue when subdivisions of the reserve do not contain appropriate balances, while at the same time the total reserve shows a proper balance.

In an effort to determine "original cost" and "cost to accounting company" of property and plant by a bookkeeping process, an account entitled "Fixed Capital Acquisition Adjustment" has been proposed. It has many ramifications, including reserves, amortization accounts, etc. If an accurate record of the cost of property is to be maintained, a minimum

of two separate and distinct sets of fixed capital records would have to be maintained; one showing original (aboriginal) cost, the other the difference between such cost and cost to the accounting company. When such a duplication is superimposed upon the suggested detailed fixed capital records, the cost reaches impossible proportions. Should the courts hold that regulatory commissions have authority to require such accounting, some practical solution will have to be worked out which must necessarily sacrifice accuracy.

Another proposal would definitely require detailed fixed capital records of a "perpetual inventory" type. "Fixed Capital Records" is not a new subject. It has received careful study for years and industry committees have published a number of papers on the subject. The proposals now being made, however, go far beyond any reasonable requirement. One company with much experience with such records has estimated that it would cost over $7 per thousand dollars of Fixed Capital for the initial establishment of such a record.

Detailed records covering investment in land, structures, equipment, etc. are valuable and should be maintained. The expense is found largely where the volume is (transmission and distribution). This writer believes we should strenuously resist the efforts which are being made to require detailed costs for individual units of property, such as poles, cross arms, guys, transformers, meters, etc., kept in such a way that a physical check can be made of individual items. In addition, the proposed accounts apparently contemplate that all fixed capital records should show eighteen separate "components of cost."

As an illustration, a company with a plant account of approximately $50,000,000 has about 175,000 poles. What possible practical benefit to that company or to anyone else can result from keeping a detailed record for each of 175,000 poles? One utility representative has demonstrated that, even when keeping totals by classes, the political subdivision proposal is such that if a utility had, for example, interstate and intrastate poles both project and non-project, including transmission and distribution poles on public and private properties in, say, fifty tax districts, the number of subclassifications required for this pole would be 2 x 2 x2 x 2 x 50, or 800. Further, if each account were required to show the eighteen components of cost,

(*Continued on page* 289)

SALES—ELECTRIC REFRIGERATORS

(Household Models Only)

MONTH OF MAY AND FIRST FIVE MONTHS OF 1936-1935

	Month of May 1936	Month of May 1935	Month of April 1936	First Five Months 1936	First Five Months 1935
Total United States	329,140	244,602	304,089	1,204,188	943,948
Maine	1,570	1,569	1,333	5,150	5,023
New Hampshire	1,514	1,149	1,290	4,915	3,540
Vermont	984	687	807	3,016	2,153
Massachusetts	12,508	11,478	13,316	48,400	38,042
Rhode Island	1,626	1,309	1,786	6,674	4,813
Connecticut	5,789	3,678	5,531	20,315	13,905
Total New England	23,991	19,870	24,063	88,470	67,476
New York	34,326	28,477	34,323	126,608	95,465
New Jersey	11,667	12,109	14,173	52,622	39,981
Pennsylvania	33,660	18,103	27,701	109,867	75,604
Total Middle Atlantic	79,653	58,689	76,197	289,097	211,050
Ohio	25,832	13,354	18,285	77,111	58,861
Indiana	10,019	5,775	7,588	34,641	24,866
Illinois	31,215	19,392	21,634	91,931	71,737
Michigan	23,200	9,555	12,726	59,295	41,337
Wisconsin	7,088	4,254	5,707	22,419	16,706
Total East North Central	97,354	52,330	65,940	285,397	213,507
Minnesota	5,098	3,858	3,035	16,701	15,518
Iowa	5,409	3,786	4,712	19,720	17,531
Missouri	9,475	5,348	9,678	39,354	32,911
North Dakota	664	934	463	2,569	2,784
South Dakota	779	743	723	3,474	3,555
Nebraska	3,069	2,508	3,101	11,642	12,117
Kansas	3,415	2,512	3,896	15,276	13,945
Total West North Central	27,909	19,689	25,608	108,736	98,361
Delaware	651	484	666	2,308	2,264
Maryland	4,552	3,474	3,625	14,868	14,588
District of Columbia	2,682	2,617	2,251	10,213	7,815
Virginia	6,341	3,823	5,105	19,924	15,419
West Virginia	6,616	3,058	3,864	17,049	10,736
North Carolina	7,476	6,480	6,619	25,168	20,406
South Carolina	3,457	2,840	3,326	12,093	9,060
Georgia	6,644	5,199	5,278	20,460	17,718
Florida	2,508	3,558	3,086	12,307	13,217
Total South Atlantic	40,927	31,533	33,820	134,390	111,223
Kentucky	4,900	2,817	3,226	16,295	11,572
Tennessee	4,616	4,924	5,827	19,681	18,188
Alabama	2,945	4,242	4,413	14,246	16,649
Mississippi	1,498	1,381	2,302	6,889	5,233
Total East South Central	13,959	13,364	15,768	57,111	51,642
Arkansas	1,675	1,618	1,749	8,140	7,381
Louisiana	2,479	2,279	3,712	12,985	10,248
Oklahoma	2,478	2,920	3,598	14,392	13,228
Texas	9,112	9,538	15,089	48,766	44,696
Total West South Central	15,744	16,355	24,148	84,283	75,553
Montana	1,308	1,311	1,192	5,185	3,922
Idaho	1,190	1,342	1,449	6,035	4,607
Wyoming	392	407	345	1,626	1,552
Colorado	2,588	1,421	1,932	8,961	7,662
New Mexico	575	468	718	2,604	2,456
Arizona	385	677	1,225	4,640	4,161
Utah	1,746	1,345	1,400	7,560	4,855
Nevada	259	371	369	1,468	1,004
Total Mountain	8,443	7,342	8,630	38,079	30,219
Washington	3,695	3,511	4,558	19,103	14,369
Oregon	2,621	2,543	3,400	13,399	9,235
California	14,844	19,376	21,957	86,123	61,313
Total Pacific	21,160	25,430	29,915	118,625	84,917

Figures based on report issued by the National Electrical Manufacturers' Association.

Merchandise Accounting

By W. H. Swinney
Controller, West Penn Power Company, Pittsburgh, Pa.

An Address before the First General Session of the Fourth Annual Convention, Edison Electric Institute, St. Louis, Mo., June 1, 1936

THE questions which I propose to discuss today are in many ways aside from the technique of accounting routines and record-keepng necessary to produce dollar figures for selling expenses and related costs. There is a wealth of literature already on the accounting mechanics of that subject and this gathering could have only an academic interest in those features.

The difference between income and outgo is the measure of success or failure of any business, and utility merchandising is no exception to that rule. Whatever confusion has existed as to the value of such activity has arisen from a failure to measure properly all the facts related to it.

The trend toward "expertness in bookkeeping," to which allusion has been made, has perhaps been beset along its course of development with frequent tendencies to multiply details unnecessarily. This has been caused in some cases perhaps by a strained effort to ascertain some desirable facts, without a proper discrimination as to the value of the accounting results sought. One of the criticisms leveled at the new systems of accounts proposed to be prescribed for the industry by regulatory authorities is the mandatory requirements for multitudinous details, the cost of which is out of all proportion to the value of the results.

On the other hand, exactness and trustworthiness in accounting results are so highly important that the end to be attained often justifies what on the surface would appear to be undue refinement in record-keeping and reporting.

It is at this point that the accounting officer exercises one of his most important functions; that is, to discriminate between that which is necessary, though costly, and that which can be approached with some degree of flexibility and simplicity in the interest of expediency and economy. This line is not always easy to draw and becomes quite involved in the consideration of merchandise accounting costs. It may be that the following definition of an accountant by some anonymous engineer or executive was inspired by a set of rules and regulations which did not discriminate carefully between the important and the mildly interesting. He says:

MR. SWINNEY

"The typical auditor is a man past middle age, spare, wrinkled, intelligent, cold, passive, noncommittal, with eyes like a codfish, polite in contact, but at the same time unresponsive, calm and as damnably composed as a concrete post or a plaster-of-paris cast; a human petrification with a heart of feldspar and without charm, minus bowels of compassion or a sense of humor. Happily, they never reproduce and all of them finally go to hell."

I should like us to consider during the few minutes at our disposal five points of interest in connection with accounting for the merchandising of appliances, as follows:

1. The extreme variations in company policies toward the attempt to add new business in this manner.
2. The real motive for merchandising appliances and the accountant's responsibility to present a fair picture of results.
3. The processes by which true results of merchandising are obtained, with specific reference to some representative results and comparison with line extension work.
4. A case example of rural line extensions and a look at the record to compare the economics of such extensions with the results of selling appliances.
5. Diverse views of regulatory commissions and courts on whether appliance merchandising is a function of the public service company.

Now, as to Item (1), the divergence in company policies in selling appliances:

We have witnessed such extreme variations in the policies of different companies, and even in the policies of the same companies under different managements that we are constrained to conclude that there must have been some material deficiency in the accounting and statistical information placed before the different executives, upon which merchandising policies were to be based. On no other hypothesis can the extremes of executive decisions be accounted for, unless it could be said that some of those who fix company policies are more susceptible than others to public attitudes and reactions. Instances are known where the executive of one company expressed his entire willingness to give to customers expensive appliances on basis of their load-building value; while, on the other hand, some companies have discontinued entirely their merchandising activities, probably out of deference to such considerations as indicated accounting losses from sales, or criticisms from independent dealers, who may accuse the utilities of unfair competition in sales prices and high-pressure selling methods. We are familiar with cases where this public reaction has reached a point resulting in the enactment of statutes forbidding public utilities to engage in this business. In other states laws have been passed requiring that separate accounts be kept with burdensome exactitude to show the results of the merchandising activities. The latter assumes, it would seem, that merchandising appliances is not a public utility function, a proposition which the industry does not concede. Many courts and commissions agree with the utilities on that.

What about Point (2), the motive on

the part of the utilities in selling appliances.

It is assumed that we may accept the proposition that utilities are engaged in merchandising electric appliances for the purpose on their part of building load, and consequently net income, and for the benefit of customers in providing them with means to the so-called "more abundant life." This promotes the commonweal of both interested parties. It becomes immediately necessary, therefore, to know to what extent a company may engage in this activity and incur apparent *selling losses* from these efforts which do not exceed the benefits from the undertaking. The words "selling losses" may be underscored to emphasize the point that, as accounting records of appliance sales are ordinarily compiled, they tell only one side of the story, because the benefits therefrom are buried in the revenue accounts and are not easily distinguishable for comparative purposes. Not only must the isolation of these revenue accretions be approached with careful thought on the basis of the most trustworthy estimates available (there is no accounting exactitude about it) but the operating expense group of accounts contains some of the most trying problems of apportionment and estimates that may be found in the entire set of accounting routines, particularly where the same employees may be engaged in other work of the public service company as well as in merchandising.

In this field we occasionally encounter a suggestion that the accountant, in prescribing rules and regulations designed to obtain information, may become so engrossed with the necessity for reliable figures that he is often accused of overstepping his accounting functions and encroaching upon the responsibilities of management. Obviously, the accountant in no case should dictate to the management what should be done or in what manner it should be accomplished, if the matter, aside from accounting, is otherwise legitimate and proper. The accountant should follow and report the facts rather than attempt to lead.

Point (3) brings us to a consideration of the processes for determining true sales results.

In the words of a well-known master of logic, let us "take a look at the record," in order to see whether or not a true record of the results of merchandising electric appliances may not be more profitable than some other types of business; for instance, the extension of rural lines, which will be discussed later.

When it is considered that the entire company policy of load building through appliance sales may stand or fall on the results which the accountant reports, it becomes necessary to go beyond what is ordinarily considered as bookkeeping and pure financial reports and to consider and report certain statistical facts bearing upon these operations. In the first place, the accounting reports per se must be compiled on a basis that will produce confidence in their use as one of the important factors in the statistics to be developed therefrom. Net income from the appliance operations, whether conducted as a selling activity of the public service company or through a separate corporate organization, forms one of the important links in the chain of special statistical data. Net income is a dollar accounting result which includes in its development a proper consideration of such items as time and expenses of employees engaged both in selling and in other utility service, joint use of offices and display space, motor equipment, etc., especially by companies serving the smaller towns or where the volume of merchandising is not sufficient to require separate organizations. Even with the latter, a point is reached in the higher supervisory positions where joint responsibility is encountered which must be evaluated in dollars and cents for apportionment purposes.

We encounter an even more nebulous line of demarcation which must be located to identify such services by the selling organization, or by joint employees engaged upon such matters, as soliciting new business, services to customers in performing minor repairs and maintenance of electric appliances, adjustment of complaints in the field, customer contacts, etc. These matters are of value to the utility company and would be carried on regardless of whether merchandising were undertaken.

After the net income (or, as occasionally happens, the net loss) is determined from the accounting records as applicable to the selling activities, it becomes necessary to attempt the determination of the measure of benefits which flow from the placement of these additional load building appliances on the lines. These benefits are reflected in the composite total of domestic or commercial revenues, and special statistical computations are required to bring out and relate these special results of load building to the appliances sold. Where records are kept of the sale of appliances by kinds and by units these sales may be tabulated into groups which will approximately conform to the consumption of power according to some generally acceptable rate classification, for the purpose of determining the probable rate which the customer will pay in using the appliances. A simple but effective classification may be set up consisting of only four groups, which may be described as follows:

Domestic Group A, consisting of heavy appliances such as ranges and water heaters which might be expected to increase the customer's load to a point where the proper rate applicable would be the lowest step in the rate schedule.

Domestic Group B, consisting of household articles such as refrigerators, ironers, radios, and flatirons, the addition of which to the lines might reasonably be expected to add a substantial load, but not to the extent of Group A, and therefore might fall in a rate step somewhat intermediate between the top rate and the lowest step.

Domestic Group C, consisting of the smaller articles, such as washers, cleaners, percolators, toasters, lamps, clocks, etc., which are largely the low consumption group of appliances, the total load related to which might not increase the customer's consumption to a point where it would affect materially his present rate steps.

Commercial Group, consisting of heavy ranges, refrigerators, air-conditioning, ventilating fans, counter appliances, etc., which would place substantial load on the lines and to which commercial schedules would apply in the computation of added load.

Classification as between Group B and Group C might be arranged so as to result in very little differences in current consumption or rates applicable to the two groups; that is, the classification might be set up to develop another type of information, such as motor-driven appliances as distinguished from the heating element or the lighting type.

After the statistics are compiled showing the classes of appliances sold and the number of units added to the lines, use is made of tables showing the estimated annual kilowatthour consumption per unit and computations are made of the expected additional kilowatthour sales. The probable rates applicable by classes are determined, and from the total kilowatthours added the estimated added annual revenue from appliance sales is computed. Using typical figures computed on that basis for one company for a year, estimated annual revenue was approximately $50,000, which load had been placed on the lines at an immediate and direct cost of $100,000, the latter figure being the net loss from sales op-

erations as disclosed by the accounting statement of operations. Ordinarily this would appear to represent that each dollar of added annual revenue cost $2.00, but this is not the whole story. In the first place, the service life of the appliances sold is not consumed in the year in which they are sold. In the second place, the expense of selling is incurred only once and that expense has been included in the accounting statement for the year. It becomes necessary therefore to evaluate the unit sold in terms of estimated life, and such estimates are fairly reliable today, as are those relating to the estimated annual kilowatthour consumption. We have available now the results of many studies along these lines. On the basis of the example used, the appliances sold would produce over their entire service life a total of $175,000 in income, which is a net figure after allowing for such additional items as may not have been included in the accounting statement, such as incremental cost of power consumed by the appliances, carrying charges and maintenance on the necessary investment to serve them, etc. Deducting from the total income of $175,000 the sales loss of $100,000 to place the appliances on the line, a net profit of $75,000 is realized in the transactions.

The question of the amount of work necessary to accomplish the results described really divides itself into two parts:

a. The preparation of fundamental accounting data regularly, and
b. The compilation of special statistical statements based on such accounts.

With respect to the keeping of accounts, it would seem that even where state laws do not require separate accounts for merchandising the value of the information to be disclosed is such that the executives of any company engaged in selling appliances could scarcely be satisfied with less than the most reliable information pertaining thereto that may be obtained. This would contemplate the making of satisfactory estimates and apportionments of the time and expenses of employees, estimates of the cost of jointly used space and equipment, etc., along the lines to which reference has been made. These would be regular monthly accounts subsidiary, or ancillary, to the accounts for other public service functions where merchandising is not carried on by a separately incorporated company. Without such regularly compiled information the basis for the statistical computations would be lacking.

As to (b), the regularity of supplementary statistical data, the decision as to the frequency of these special statements would depend entirely upon the desires of the management. They could be compiled monthly, quarterly, or at other infrequent periods. Inasmuch, however, as most companies selling appliances desire current figures relating to quantities of merchandise sold by units and classes, the additional work necessary to round out the picture as here indicated is not material once the forms and routines are established and the plan is in operation.

As a fourth consideration, illustrating by a specific example the discriminatory responsibility of the accounting officer in presenting an accurate picture to management, let us look at the problem of rural line extensions.

We have heard a great deal lately regarding the alleged lack of business acumen displayed by the utilities in the extension of rural lines, and the apparent lack of enthusiasm with which this matter has been followed in the past. This has been accompanied by caustic criticism in many cases of so-called losses which have been incurred in the merchandising of electric appliances, the thought being, if indeed there was any thought given to the matter by these critics, that the utilities were wasting their substance in futile and insignificant efforts to place electric appliances with the customers and failing to recognize an alleged revenue source of tremendous proportions in the extension of rural lines.

Let us see what results might be expected from the extension of lines to connect new customers, but it should be understood that the following figures are representative only within the realm of reasonable estimates and relate to minimum revenues which a utility company requires to warrant the extension of lines under rules and regulations generally recognized in the industry and by regulatory commissions. Assume the extension of lines on a basis which will produce gross revenues equal to 18 per cent per annum on an investment by the utility of $100,000 (the same amount expended in selling appliances). By merely assuming necessary revenues in this amount, we avoid entering the controversial field of how many miles of lines can be constructed with those dollars and how many customers per mile would be connected. On that basis approximately the following results could be expected from the minimum revenue referred to:

Annual Gross Revenue		$18,000
From which should be deducted:		
Carrying Charges on the Investment	$7,000	
Renewals and Retirements or Depreciation at 5 per cent	5,000	
Cost of Energy to the Distribution System, at 1 cent	4,000	
Distribution, Commercial, General and Miscellaneous Expense, including Meter Reading, Billing, Collecting, Servicing, Operation and Maintenance	8,600	
Taxes at 10 per cent of the Revenue	1,800	26,400
Net Deficit from Revenue...		$ 8,400

Inasmuch as an item of $7,000 was included among the costs to cover a fair return on the $100,000 investment, the loss of $8,400 not only produces no return upon the investment but falls short, by $1,400, of reimbursing other out-of-pocket costs. The cost of money to the utility used in building the lines is no less real than other costs.

The foregoing costs are not exaggerated (see tabulation in *Electrical World,* July 21, 1934, page 78), but are typical of figures included in many reports and papers dealing with such costs contained in published proceedings and trade papers. It should be remembered, however, that they relate to minimum guarantees required by utilities in line extension work. Nevertheless, it does indicate the initial margin on which the utility companies have undertaken to extend their lines to connect new customers.

It should be remembered also that the density of customers per mile on rural lines which may be built in the future will be less than that which now obtains on existing lines. In the figures used in the example an average of five customers per mile was estimated, whereas the report of the Rural Electrification Administration covering the first seventy projects completed under its program showed an average of 3.63 customers per mile connected, which represented the construction of 11,000 miles of rural lines at a cost of $12,000,000 and a total of 40,000 customers connected. This means that in future, if fewer customers are connected, they will be called upon to pay larger minimum charges if the

revenues are to be sufficient to pay a fair return upon the investment.

Perhaps a further word of interpolation is warranted in regard to the use in the comparisons of the full service life of appliances sold, whereas the results of the line extension work are cited for only the first year of operation. Obviously, no utility could think of line extension work on the basis of such a first-year result which would be continued indefinitely. Granted a realization of hopes for increased revenues from the extensions over the future, the long-time maximum return therefrom would probably be limited by regulation to 7 per cent or perhaps less, and over the first few years, corresponding to the average life of the appliances sold, the company would do well to recoup its early losses with little or no return on its investment. So we do have a reasonable basis of comparison in the two periods.

In the final analysis it may be presumed that the operating policies of all companies are the same, accepting always the fundamentals of good service and reasonable rates. The whole matter was summed up by one executive when asked to state the policy of his company. He said, "Net."

Compare, therefore, the deficit or lack of return shown on the line extensions with the outright profit of $75,000 indicated from the sale of electric appliances, which profit was after recouping an initial sales loss of $100,000. Certainly, the accounting statements alone which reflected the out-of-pocket cost of selling cannot be accepted as making up the complete picture of these activities.

It is only through this departure from sole reliance upon book figures and the merging of accounting and statistical analysis, which yields nothing to accuracy, that true results of merchandising operations can be determined.

Our last point has to do with the lack of uniformity which plagues the utilities in rate proceedings in preparing statements of so-called "fair return income."

This matter is of outstanding importance to the utilities and relates to the diversity of views held by regulatory commissions and the courts with respect to the accounting disposition in rate proceedings of revenues and expenses relating to merchandising. On the one hand, the Supreme Court of Pennsylvania, in recognizing not only the right but the duty of the utilities to merchandise, said:

"Far from preventing the Company from dealing in the converting devices needed, it would be our inclination to insist that it is part of its duty to furnish them to its customers.

"The public had not been educated with regard to the multitude of conveniences which the electric current will supply. To furnish the housekeeper with the electric current alone would have resulted in neither profit to the Company nor convenience to the customer. What the latter wanted, and what the legislature intended to grant when it authorized the respondent to furnish light, heat and power by electricity, was something more than furnishing the customer with the end of an insulated copper wire, that he did not know how to use, or had not the appliances to use. It was intended that he should have, and the Company should furnish, the conveniences that could be obtained by the use of the electric current." (C.P. No. 4, December Term, 1928.)

On the other hand, the United States District Court for the District of Idaho, in Idaho Power Company v. Thompson, P.U.R. 1927D 388, 19 Fed. (2) 547, held, in a rate case, that income from the merchandising of an electric utility should be excluded from gross revenues and that the expense of window lighting of a salesroom and rental pertaining to the merchandising of the utility should be excluded from operating expenses for the purpose of testing rates. The capital invested in the business was excluded from the rate base.

These differences of opinion, of which the two cited are merely representative of many such cases, can be accounted for only on the assumption that the true accounting and statistical result of merchandising could not have been placed before the tribunals which made these conflicting decisions. It should be borne in mind also that, in referring to the exclusion of revenues relating to merchandising, the decisions in all cases, so far as can be determined, referred to direct revenues from the sale of appliances and not to the revenues produced through the sale of additional current.

The utilities would be lax in such proceedings if, in those cases where regulatory bodies exclude merchandising revenues and expenses from operating income and exclude investments relating to merchandising from the rate base, they do not insist also upon the exclusion of revenues resulting from the sale of current consumed by the appliances sold. This would paint the picture with such a materially different color that the utilities, in all cases of wise merchandising, would gain by such exclusions, and would probably result in the treatment of merchandising activities as a part of the public service function which the utilities are chartered to perform.

The still unsettled status of the proper disposition in rate proceedings of the results of merchandising is to be found in the straddling of the question in the draft of a Proposed Uniform System of Accounts to be Prescribed for Electric Utilities by the Federal Power Commission, which the Commission has stated is to be made effective January 1, 1937. In its form of income statement provision is made for the determination of "operating income," which is the important computation of earnings to be applied to the rate base, first, by excluding therefrom the results of merchandising and, again, by including such results in operating income. In other words, "you pays your money and you takes your choice"; but that choice is not one to be exercised by the utility but by the regulatory commission within whose territorial jurisdiction the utility may happily or unhappily be located.

To summarize quickly:

The greatest care is necessary in the exercise of judgment as to how far details should be multiplied in obtaining accounting and statistical results, and a fine but important distinction should be drawn between figures which must be compiled regularly and those which can tell an equally good story if compiled only at intervals as a special undertaking.

We have considered the diversity in policies of different companies and traced the probable cause to lack of uniform and sufficient data.

We have also discussed merchandising from the business motive viewpoint and the accountant's responsibility in the picture, emphasizing appliance selling as a true utility function.

Again, we have indicated representative results from the extension of rural lines and portrayed rather lean years of return initially therefrom.

Further, we have presented a comparison of merchandising results with line extension work.

And, finally, we have outlined briefly the present unsettled status of the results of merchandising operations as viewed by different commissions and courts. Ultimately, it is hoped that this matter will be presented to the Supreme Court of the United States in such a clear-cut case that the right of the utilities to classify the merchandising of ap-

(*Continued on page* 305)

National Sales Programs Create Better Understanding

By G. W. Allison
Field Representative, Edison Electric Institute

An Address before the Fourth General Session of the Fourth Annual Convention, Edison Electric Institute, St. Louis, Mo., June 3, 1936

THE greatest need of the electrical industry today is a clear understanding of the service it renders and the cost of that service. A clear understanding must be based upon facts. These facts must set out in bold relief an unquestionable presentation of service and its costs. When this is done the problems of sales and merchandising will be simplified and solved and many other problems will fade like fog before the sunshine.

There are three classes or groups of individuals who must be reached with these facts. *First:* There is the public, the consumers of electrical service. The consuming public is very much interested in service. Without doubt there never was a time when the public was so electricity conscious as it is today. The public knows the value of electrical service, and that knowledge is based upon years of experience with this industry. The keenest point in the public interest today, however, centers around the cost of electrical service. *Second:* The next group to be reached with the facts is that entire group which supplies the public with the means for enjoying electrical service. This group represents all of those who manufacture and sell current consuming devices. The manufacturer, the jobber, the wholesaler, the distributor, the dealer and the salesman are just as important as they are numerically strong. *Third:* The third and last group which needs a clear factual understanding of this industry is all of that group who have to do with the generation of electricity, its distribution and application to human problems. Anyone who serves or in any way contacts the public should know the true factual meaning of the service his industry renders. Normal human beings enjoy the conviction that their association is with a meaningful industry. When such conviction is based upon a factual understanding any opposition will find a formidable force with which to reckon.

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The objective of all three groups is mutual. The public wants the service, and it is interested in increasing that service. But, it wants it at a fair and just cost. The suppliers of current consuming devices want volume, and they want that volume at a minimum of sales cost. The operating companies want load that will justify the service they render, and they want public relations that will make safe and secure their positions. A clear factual understanding, by these three groups, of the electrical industry and the service it renders will create an appreciation of this industry which will give all three classes the fulfillment of their desires.

Does anyone require proof that this industry is not understood and appreciated? Does not the discontent of the public; its ready acceptance of propaganda and agitation prove the case? Does not the flood of anti-utility propaganda, much of which is untrue, prove the case? Proof is not required. We have it in an abundance.

Why is this industry not understood? It is not because people generally are unfair. It is not because people generally are unreasonable. It is not because people generally refuse to consider facts and weigh the evidence. The basis of this lack of understanding is due to the failure of this industry to interpret its service in understandable terms. What a person does not understand he cannot appreciate. There may be many reasons why people generally do not understand this industry. Two of the chief reasons are these. *First:* The electrical industry is a technical industry. For most people it borders upon the mysterious and the miraculous. Its exact description can only be made in mathematical and technical terms. Few persons understand or enjoy technical phraseology. Therefore any technical explanation of this industry and its services falls both flat and meaningless. *Second:* Electricity as a product serving human life is so different from most other products used by the public. With practically all other products there is much evident action in production; a considerable amount of action in transporting these products. Trains, ships and trucks command the attention of people generally. Then there enters the question of individual responsibiltiy. Most of these products are to be found on display at retail stores. The person desiring such products must go to the retailer and select the kind and amount he needs. He must arrange for its delivery, and after delivery he is responsible for its care and use. What a contrast with electricity as a product. There is little evidence of its production; no apparent action in its distribution; it is not on display at retail stores; there are no trucks delivering it to the homes; the public does not have to order it in stated amounts. Regardless of the quantity they will or will not use they do not have to think about it. Anything that does not attract by action and that does not compel responsibility and cooperation in its use cannot be understood or

appreciated. Then there is one other disadvantage, and that is in the bill rendered for the service. Of necessity the bill is rendered as a total amount. It is pretty much human nature to look at a total amount and question it. We question the total until we have satisfied ourselves by checking an itemized statement.

This lack of understanding affects the public attitude toward the whole industry. If the public attitude toward an industry is good that industry stands to do a maximum volume of business at a minimum sales cost. But when the public attitude toward an industry is not good that industry stands to do a minimum volume of business at a maximum of sales cost. Bad public attitude makes the public a prey for the agitator and the propagandist. Lack of understanding is fertile soil in which the seeds of mistrust and discontent germinate quickly into rank injustice and rash action. Public attitude also is a determining factor in the financial status of an industry.

The electrical industry is one of the most vital industries in this country. Few industries touch life so vitally. Recent floods proved this to the affected communities beyond any question. There are few industries that can match the service record of this industry. A progressive story of improved services, and a continuous story of the reduction of the costs of that service. Today there are few if any products from raw material to finished product in consumer use that compare with electricity in efficiency and cost. This industry has one of the finest of stories to tell. And it must tell it, for the public is hungry for the facts. If the public knew the facts they would appreciate this industry, and with that appreciation would arise in rebellion against the agitator and the libelous politician. The present vogue of attack upon this industry would not be popular. And, unpopular causes do not have many ardent exponents.

How are we to create this better understanding? National sales programs are one big answer. National sales programs have proved their worth. They have brought better understanding to the public, to the suppliers, and to the operating companies. They have increased public use of the service; they have increased the volume of sales for suppliers; and they have built up the load for the operating companies. Anyone who has participated in a local cooperative sales program knows of its value. In contrast with local sales programs a national sales program increases the value of the local activity, stimulates local action beyond local possibilities, and renders an industry benefit not possible through local activity. A national sales program gives the industry a theme song, a uniform sales message. That message appears in the national advertising and the local advertising; it is seen on bill boards, heard on the radio, seen in dealers' windows and stores, and carried by all salesmen. When everyone is saying the same thing, and saying it at the same time, the value of advertising dollars are increased, the effectiveness of sales messages are increased, and the volume of sales are increased. There are two splendid illustrations of this fact. The Electric Refrigeration Bureau, and Better Light for Better Sight. Both of these activities were highly cooperative. They had uniform messages. In the refrigeration program the emphasis was placed upon the need for refrigeration. That was the theme song. Everybody told that one story. The unanimous agreement of the industry and the continued repetition of that message made its favorable impression upon the public. Electric refrigerators sold in increasing numbers in spite of the depression. Better Light for Better Sight is another outstanding example. Light is the first thing this industry gave the public. We never had to sell light. And we cannot brag too much about the lighting job we did. Right in the depths of this passing depression Better Light for Better Sight was launched. It gave the whole industry another theme song—a uniform sales message. It was a message that everyone could and did tell. It was a story of meeting human need, conserving eyesight, and increasing human efficiency. The unanimous agreement of the industry again captured the public attention. The public increased its use of service, the lamp manufacturers increased their sales, and the operating companies built up their load.

National sales programs can be the vehicle through which we, as an industry, learn the facts of our service, and through which we impart these facts to the public. A sales program must center its thinking around the idea of service. Service, its efficiency and its cost, is the meat and core of the entire proposition in which everyone is interested. A sales program that does not justify its approach to the public with facts loses a tremendous opportunity.

The facts of this industry, facts that explain and clarify services and their costs, represent the prime medium of making sales. National sales programs are the logical medium through which these facts can and should be presented. The story of service and its costs is the uniform message for the industry. The facts of that service and its cost are the responsibility of each local company to develop and present to its communities. With the presentation of these facts goes a cooperative selling program. Through such activity there is created better understanding among all units of this industry.

The city in which we meet today furnishes a splendid illustration of the proof of this subject. The aggressive tie in with national sales programs speaks far more eloquently than any man can speak. Here we find all the factors involved, aggressively used and gloriously realized. The public has been responsive, the suppliers have been cooperative and active, the company has set a real standard of local tie in with national programs. The public has increased its use of electricity, the suppliers have enjoyed splendid volume, and the company has increased its load to match its rate reductions. And with all this it enjoys excellent trade and public relations.

National sales programs offer this industry the solution of most of its problems. We can sell our way out of our troubles. We can sell our way into an ability to pay dividends. We can sell our way into the good graces of an understanding and appreciative public, and when that is done we will have fought a good fight and we will have kept the faith.

This issue and the preceding issue of the Bulletin contain the complete Convention addresses and papers. Since no formal proceedings of the Institute are published, it is suggested that these issues be preserved for your Convention record.

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Three Decades of Utility Sales Development

By C. E. Greenwood
Commercial Director, Edison Electric Institute

An Address before the Fifth General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 4th, 1936

IN the early months of 1934, there was rejoicing in Government circles. A new alphabetical bureau was created by due process of law and christened Electric Home and Farm Authority. The event was heralded by an outburst of silver-tongued oratory which spread the message throughout the nation that the "more abundant life" was nearer fruition for the people of Tupelo, Tennessee, and environs. At the same time a charge was made to the effect that the private utilities had been laggards in selling electricity to the homes of our nation.

Although we conceded that there had been those utility leaders who had been slower in developing the marketing mind than others because of the legal, technical and financial phases of our business which had held their immediate interest, and that there were those who had been conservative in action, we let the harangue take its course because we recognized its political significance. The affrontery of this attempt to obscure the world leadership of American private business, and the place of the utilities in it, was clearly recognized. The facts of our sales progress were before American business for review. Therefore, the challenge had an amusing side. These gentlemen could not be serious in their attempts to insult the intelligence of the men who have been building successfully for many years.

Then, too, there was already emblazoned on the records an estimate of the Committee appointed by the Board of Trade of the British Government to review the national problem of supply of electrical energy. In their Report of 1926, several years before the lusty Government marketing specialists came into being, one reads the following comment — "We find that in America the great supply systems have developed the business of selling electricity into a very fine art, with the result that there has been a rapid increase in the consumption of electricity per head of population."

Recently the sheer nonsense that

MR. GREENWOOD

TVA has taught the private utilities how to sell commanded the attention of distinguished writers. The idea registered with certain newspaper editors. Perhaps some one in the electrical industry may have this germ. Surely, multitudes of our customers might not sense the purpose of these pronouncements. They do not have the facts, and furthermore their interest in the broad utility problem is concentrated largely in the electric service they receive in their own homes, and the price they pay for it. The national issue is to them just another political combat. This program of heckling and harassing must be accepted by the private companies, but in fighting mood, until the political expediency factor of our competitor is without value. However, it is important to refute forcefully now this latest impression that any Government bureau is our sales mentor.

The theme of my discussion—*Three Decades of Utility Sales Development*—would lead one to believe that I mean to search into the past to point out the fallacies of our critics. The *limit* of your endurance would give me one minute for each year. It must suffice here to impress in less time just a few high spots in utility sales history.

So now— with apologies to Al Smith —"Let's look at the record." Will you picture a convention meeting of the National Electric Light Association at Atlantic City the first week of June, in 1906? Pertinent to my subject, I quote just a few squibs:

Mr. John Meyer, of Philadelphia, stated in introducing his paper on *Mechanical Refrigeration,* "At the present time central station interests are scanning the field for sources of revenue other than that derived from the sale of current for arc and incandescent lighting. Mechanical refrigeration, having as its source of power the electric motor, is an outlet for our product and deserves much consideration."

Mr. George N. Tidd, an executive familiar to, and respected by all of you, contributed sales wisdom then, as now. "Increase of sales," said Mr. Tidd, "is of vital importance to the success of the central station. The business cannot stand still. It must either grow or diminish; there is no middle road. The most unpromising field can be made productive to an unexpected degree by the simple method of pushing the sale of current by usual commercial methods."

Then Mr. James I. Ayer, of Boston, in a paper on *Electric Heating and the Residence Customer* said, "The residence customer demands the service but cannot appreciate that it is the most expensive you give, and if you explain, he thinks you should find a way to cheapen it, or average your costs and reduce his rates. * * * * * Electric heating devices offer an opportunity to quickly get in closer relation with more people in an effective way than any other means at our command."

First Decade—Pioneering and Experimentation (1906-1915)

Now I submit that the keynote of utility sales development was sounded in 1906, and that thirty years ago, and not three years ago, the electric utilities were fully aware of the import of the appliance load for increasing the value of

the service and the earning of lower rates. Our Administration critics are "new" dealing in so many ciphers these days that the dropping of one might be forgiven under stress of circumstances.

Think how meager was the list of appliance service items to draw upon in that era, and what a stupendous task of pioneering was lying ahead! Crude models of vacuum cleaners were being perfected at the time, based on the Kenney patterns of 1902. A practical model washing machine was built that year. Electric irons had been produced on a large scale for two years only, the manufacturer being inspired by the potential possibilities of load building by the utility.

In this first decade, which we might label Pioneering and Experimentation, there were no dependable electric refrigerators for household use. It was 1909 before an electric range was built that would stand up for a reasonable length of time, and the following year an open coil system of heating was exhibited at the Convention of the National Electric Light Association in this City. Generally speaking, the products of manufacturers were under-developed, and the utility approach to the customer was on a trial basis of use.

Progress in marketing appliances for household use in this pioneering decade might best be illustrated in a few examples of achievement in utility selling. The files of the trade magazine, *Electric Review and Western Electrician,* of July, 1915, refer to the campaigns of Toledo Railway and Light Company in which 2,508 appliances were sold in ten days of July. Three hundred vacuum cleaners at $50 each were sold in a one month's drive. I could quote similar outstanding sales records in Chicago, Philadelphia, Boston and a score more cities.

That same year, Portland, Maine, had an Electricity Week with a local newspaper—*The Portland Argus*—offering prizes for the best essays on the conveniences and uses of domestic appliances. Jumping west to Louisville, Kentucky, we find that the manager of the local utility in 1915 conceived of a novel idea of disposing of heating devices and cooperating with the contractors and department stores in a pre-Christmas sale that piled up a total of 6,200 heating appliance sales in thirty days. Published records unfold also that at the close of that year, "Three-fourths of the customers of Utah Power and Light Company were using electric irons and a washing machine was operated by every seventh customer."

The commercial manager of the company said at that time: "Many of our customers are only seen by the meter reader and office cashier. Consequently the more that we can interest these employees in sales work the better results we can secure. We are pleased to report that sales by this class of employees are materially increasing each year."

Please note that Employee Selling, Cooperation with Dealers and intensive Selling Campaigns by the utility were not inspired by the goading of Government competition, but were the start of sound economic business development a score and more years ago.

I might cite many more examples of noteworthy sales accomplishment of electric utilities in the ten years following the call to action of leading utility executives in 1906. It will suffice to add that Minneapolis General Electric Company doubled kilowatthour output in the three years 1912-1915, and Boston Edison had such a high per capita connected load among residence customers that an extensive survey among thousands of customers was made to determine what appliances were in most popular use. The time-proved promotional practices of the utility companies are now helping to build load for Tupelo and Alcorn County.

The utilities had learned a sales lesson in this Pioneering period. They knew it was possible to increase energy output at a much more rapid rate by going out to do intensive selling to householders. People still did not rush in the stores to buy.

The average domestic output in 1915 was 260 kilowatthours per residence. Other than the range, which was still in the development stage with comparatively low wattage units, there were no large current consumers that could be popularized. To be sure 300,000 ranges had been sold in the United States up to that time, but less than half as many electric refrigerators. Unfortunately sales development in connection with electric cooking was in advance of the development of the range itself. It was still lacking in qualities necessary to compete with other cooking fuel on a large scale.

Second Decade—Intensive Selling and Expansion (1916-1925)

The second decade was an era of Intensive Selling and Expansion. Total homes wired increased from approximately 5,800,000 in 1917 to about 15,300,000 in 1926 of which approximately 250,000 were in rural areas. Wiring costs were financed by private capital. There were no REA's nor EH and FA's to assist. Notwithstanding this 200% increase in number of meter accounts, the energy output per home increased during the same period approximately 60%, although we passed through the ravages of the World War. The utility industry was attempting to beat off the ominous threats of the depression of 1914 when the conflict started in Europe. In 1915, the average energy output per home dropped from 268 to 260 kilowatt hours and during the War years made gains of but 3 or 4 kilowatthours.

The SOS for American munitions and supplies started our factories humming. When in April, 1917, the United States declared war, the concern of the utility was Production and not Distribution. Salesmen were called to the trenches. Appliance sales development lagged temporarily. Even the manufacture of certain appliance lines was restricted by the War Industries Board.

However, as the call for labor and more labor in factories was repeated, professional household servants swapped their caps and aprons for smocks and overalls. The drain on domestic help was so severe that only a favored few with fat purses could afford to hold the servants that stayed in the business.

Home became the scene of social revolution. Housewives became acquainted with their home workshops as never before. They soon wanted mechanical servants. Again the utilities sensed opportunity for more progressive promotion of domestic business, with the result that the year following the War the average energy output per home spurted to 293 kilowatthours. More utilities were inspired by economic opportunity to establish appliance sales departments.

Confident that the utilities would be powerful assistants in distribution, the appliance manufacturers started volume production. One of the outstanding features of utility selling developed during this second decade, was a satisfactory recognition of the aspiration of different classes of dealers to sell those appliances that had gained public acceptance as a result of the vigorous and effective promotional effort of the utility.

In 1921 another economic disturbance showed its effects on utility sales progress. Again the upward trend of energy

output gains for domestic service was cut to a small percentage of those of the two previous years. And what did the electric utilities do about it? When in 1922, the index of business recovery pictured the utility as lagging behind other industries, the best marketing minds in our industry, under the leadership of the then President of National Electric Light Association, organized nationally the Joint Committee for Business Development, including manufacturers, wholesalers and dealers. United effort to revitalize electrical sales brought forward extensive promotional plans. The electric utility expanded advertising budgets and increased selling pressure.

There had been some realignment in distribution channels. New and approved electrical household devices had made their way into the market, and new methods of volume production which required volume distribution and influenced high pressure sales methods. The manufacturer looked out beyond the then accepted horizon of the electrical world and actively bid for the participation of the department, hardware and furniture stores as outlets for electric equipment. Many sold direct to the consumer.

The Joint Committee functioned for two years laying a constructive basis for broader electrical sales development. The Committee was cognizant of the supreme effort along informational and educational lines that was absolutely essential to combine with selling in order to reach the public, and even the employees of the industry.

This desire for a promotional offensive on a wide front was expressed in the initial program of the industry organized on a national scale. It was developed by a Lighting Educational Committee, organized with utility leadership to promote better lighting in the home. The promotional expenditure in this movement was somewhat staggering from the viewpoint of the electrical industry, although modest in comparison with the advertising budgets of competing industries. During 1924 and 1925 advertising of the Lighting Educational Committee which sponsored the movement appeared in twenty-one leading advertising media. The numerous forms of promotion created revolved around a Home Lighting Contest. Over a million essays were submitted, the prize being a $15,000 model electrical home. The undertaking grasped the imagination of the public, impressed the message of good lighting, as then styled, and was an outstanding industry success.

The second decade of Intensive Selling and Expansion had closed with a new outlook on commercial progress. Experience had emphasized that the time was opportune for broad national marketing of domestic service.

Third Decade—Coordinated Industry Sales Development (1926-1935)

Executives were now convinced that there was no monopoly on household services. There was competition all down the line—the washing machine and ironer with the public laundry; the vacuum cleaner with the carpet sweeper and broom; electricity as a fuel with coal or gas; electric refrigeration with ice or of greater immediate importance, competition with no desire for refrigeration at all; competition of electric equipment of all kinds with automobiles, and in general, dollars for electric equipment and service versus dollars for beautification and entertainment. Here were major marketing problems to be tackled. Inter-industry competition was of paramount importance, and therefore mass selling activity was the call of the day.

But such mobilized industry promotion and selling demanded coordination, and to this end leaders in the utility association counseled, and after months of deliberation, a Commercial Department was established at Headquarters of the Association. The home lighting activity was a worthy yardstick for determining the course of future selling.

Added zest was given to the merchandising function of the utility companies when, in June of 1925, the late Mr. E. N. Hurley of Chicago, president of the Hurley Machine Company and later Chairman of the U. S. Shipping Board, offered prizes in the amount of $10,000 to the electric light and power company that during the ensuing year would make the most constructive contribution to developing more effective methods of merchandising electrical household appliances.

Mr. Hurley's offer was accepted. Contest rules were adopted and the prizes were awarded at the Convention of the National Electric Light Association in **June, 1927.** Honors went to Ohio Public Service Co., Cleveland, Ohio; Texas Power & Light Co., Dallas, Texas, and to Union Gas & Electric Co., Cincinnati, Ohio.

Still another National Contest, a creation of the Merchandising Committee of the utility association, was announced. "One More Kilowatt Hour Per Day" was the rallying slogan, and this was expressive of its objective. The utility companies making the greatest gains in annual energy output per domestic customer received the honors in 1927. Prizes were awarded in three classes. The leaders were: Cheney Power & Light Co., Cheney, Washington, with a total increase of 195 kilowatthours for the year; Central Power & Light Co., San Antonio, Texas, with an increase of 159; Western Public Service Co., Beaumont, Texas, with a total of 103 kilowatthours. These and seventy other companies were inspired ten years ago by keen rivalry for business gains, and not by government competition. No—the statements of TVA leaders do not jell with the facts.

This third decade which I captioned Coordinated Industry Sales Development had opened auspiciously. The scope of selling vision was extended. The manufacturers had helped to pave the way. The electric household refrigerator, practical models of which had been introduced ten years previously, had now proven itself. Statistics tell us that 150,000 had been manufactured up until 1926 (including exports) and had not the World War dawned upon us, development would have been much more rapid. The refrigerator rendered a particularly valuable service to the user and was ready for intensive development. It would more than double the national average consumption at that time.

But a market survey assured that the majority of American homes did not use refrigeration of any kind nor were housewives convinced of its necessity. A national campaign of education and information was essential. Such a Plan was developed and carried through jointly by utilities, manufacturers, and other groups interested in the protection of foods, to establish a definite ice box temperature for adequate food preservation, and to sell the idea of all-year-round refrigeration. The accomplishments of the National Food Preservation Council are a matter of record. The ground work was laid for the next step in the development of the electric refrigerator load, that is, the aggressive selling of electric refrigeration service.

The progressive step followed with the organization of the Electric Refrigeration Bureau. It was headed by Mr. J. E. Davidson, past President of the

National Electric Light Association, and President of the Nebraska Power Company. It continued to function for more than three years making a record unsurpassed in promotion and selling. Again the mobilization of utilities, manufacturers and other selected groups, national and local advertising, and the powerful force of cooperative and coordinated action scored a triumph, and produced a background for amazing sales volume of electric refrigerators. The momentum created carried sales forward during the recent years of economic upheaval despite reverses in practically all other industries.

The onward march of utility sales development over three decades now climaxes in these established national cooperative sales programs as the most far-reaching and effective method of gaining attention in the market-place for specific electric services. Expressions of this thought are the Better Light-Better Sight, National Kitchen Modernizing, Electrical Housewares and the Running Water Activities, all motivated by Edison Electric Institute and all in action at this time. Passing mention only is made of these because they are all familiar to you and speak for themselves.

It is of more than passing interest that the national sales programs created by the electrical industry have contributed to the social welfare of our customers, and have been helpful to other industries, as well as appealing to our selfish motives.

Government Sales Competition

In presenting this sketchy review of utility sales development, I would be remiss were I not to refer briefly to the plus and minus sides of Government sales competition. It is an oppressive competition because unfortunately it dominates with a vindictiveness never unfolded by other competitors. It has the power to place burdens on the backs of the very men that must fight for their position in the market-place. It is a competition that dismisses sound economics with a gesture.

The major objective of our competitor is to please the voters at all costs. And why not? A political wand can be waved and loss be turned to profit just by taxing the competitor. It is a case of heads he wins and tails we lose. He entered the utility field when selling technique in the electrical field was highly developed. The major load builders had reached a high state of perfection and reliability of service, and public acceptance had been built up in some, if not all sections of the United States. The National Electric Cookery Council, an electric industry program, had helped to broaden the electric cookery market. Every household device had been pioneered and sold by private utility effort.

The sales methods of utilities and all dealer groups had been tested and successfully applied so that a fund of valuable sales experience was available. It is significant that in scanning every inch of the Government yardstick we do not find one sales accomplishment in three years that has not been duplicated by some private utility in the past under more exacting conditions.

Now experience has shown that Government competition can be a strong arm in removing handicaps in domestic load building. To illustrate:

(1) Three years ago the manufacturer, facing a situation of depleted income levels among buyers, revised his prices downward for "leaders" and was no doubt influenced somewhat by invitation. Although the need of lower prices for electrical equipment was long the subject of friendly discussion between utility and the manufacturer, the big stick of force was never brought to bear, but the utility joined with the manufacturers and trades, and developed ways and means to absorb greater volume in order to justify lower prices. Lower unit prices, like lower priced kilowatthours, automatically result from volume selling.

(2) Again, in the American scheme of distribution of electrical goods, the manufacturer, the wholesaler and the dealer get a profit before the user buys, and the equipment can earn revenue for the utility. Attempts made by utilities to cheapen prices to the consumer through bi-passing regular channels of distribution, sacrificing profit on sale for load-building value, or the extension of terms of payment to the consumer, engendered discord between the utilities and the trades, resulting in anti-utility merchandising legislation being introduced into fourteen States in the past few years. And yet, the utility had but one purpose in its short-cut methods in aggressive selling, that is, more electric equipment in the homes of consumers that they might enjoy to a greater degree the comforts and conveniences of electricity. That is the objective of the President of these United States although he terms it more aptly perhaps, "Cheap electricity for the more abundant life."

The policy of the private utilities in building dealers for building business has brought gratifying results in surmounting these handicaps of trade relations. In 1935, out of a total of slightly more than $865,000,000 in appliance sales to be attached to utility lines, but approximately 10 per cent were sold by the utilities direct.

(3) The National Housing Act of 1934 forced a new outlook on time payments through Government insurance of the banker up to 20 per cent of the total invested in this class of loans. A new lesson has been learned through Government pressure on the finance companies which would have been unethical for the utility companies to have impressed and with small chance of success. Just in the past month, in a meeting of representatives of trades and finance companies, the utilities were referred to as offenders in encouraging long term financing of electrical equipment. This indicates that it takes time to break a habit.

(4) It is fair to admit the handicap of rate forms of some utilities that did not encourage the promotion of certain classes of business. It happens that private utilities are owned by the investors in their securities. Our objective must be service with PROFIT, and unless low rates are EARNED by the customer through fuller use of the service—the only condition by which the private utility can transact business at a profit—then the customer does not get the low rate. Granting that Mr. Ford, and perhaps a few other manufacturers, have attempted to reverse the volume-makes-the-price theory, the experience of most business is that as volume increases, prices are lowered. It is sound business. It is particularly sound policy in the electric utility industry, for it places on company management the obligation of offering promotional rates and encouraging aggressive sales development, backed up by effective advertising, that the day of still lower average rates may be hastened.

The marketing policy of our Government competition is based primarily on the low-rate influence on volume sales of equipment. Granting this gamble works to a degree, and can be tried when money comes easily, low rates in themselves will not produce the cherished goal of complete home electrification and complete contentment with the rate. It is an officially recognized fact that the electric consumers of the States of Oregon and Washington have the highest consumption per capita and the lowest rate per kilowatthour in the United States. Yet in these days when electric rates are serving as a political football, it is not unusual for customers, even in this region, to join in the game and take a kick at it.

Now every cloud has a silver lining. From a marketing angle we find an item of large interest on the plus side. Let me say this: Our Government sales competitor has made a stupendous contribution in publicity for domestic electric service. I would not attempt to estimate the amount of money that has been spent by the electric utility industry in promotion and advertising over past years. However huge this sum may sound, it was not enough. Every square inch of

that newspaper advertising telling the householder of the true value of electricity in making the home a better place in which to live, radio broadcasting, volumes of printed literature, all have been paid for in the advertising budget of the utility; the post office department has been enriched from mailings, and all have been charged to the cost of rendering electric service. It is the only way out for private business.

But under the caption *POLITICAL NEWS,* thousands of column inches carrying this same electric service message have been emblazoned for our competitor in the newspapers free—often on the front page where space comes high. To be sure, people have been made "rate" conscious at the same time, but the voters cannot be made rate conscious without telling them "What's all the shooting about."

Fuller use of domestic electric service in twenty-one million homes in the United States is still our greatest potential opportunity for service and profit. How warped our marketing judgment would have been, had we not grasped this opportunity to gain every advantage from this wave of accelerated public acceptance that results from the impressive and expansive promotional campaign that our competitor wages in synchronism with our efforts.

In conclusion I would urge that we meet competition of all kinds with more business. We can sell our way out of many of our difficulties. The public can know the value of electric service only through widest use. Intensive sales development must be focused on each major service. I would hazard the opinion that the radio musicale with an occasional announcement of what good fellows we are will not do our selling job. The most attractive four-color advertising campaign in every national medium in the country would not be effective with a general message of electric service values. It would be nullified by a combination of municipal, state and federal anti-private utility propaganda now universally rampant. I repeat, it will be more effective to shoot at bulls' eyes, each a specific service that the housewife should want. This we are attempting in our National Programs.

Let us bear in mind that the old home mottoes that once read "The Lord Will Provide" are now rewoven in worsteds of sunset hue to read, "Uncle Sam Will Provide." Our publicity should get close therefore to the old home fireside, and impress constantly the value of the commodity we sell and its low cost compared with other expenses in the family budget.

Such a practice as listing the leading electric servants at one side of the monthly statement, now followed by a few utilities, will be potent. It helps the electric service bill to speak for itself. I suggest periodically applying this message, "Before paying this bill please check the services electricity rendered in your home last month and then advise us if you think electric service is not worth the price you pay for it." Do not be afraid of the "noes." Most of them are the low-use customers and make the best list of "hot" prospects for buying more service.

At this time I plead for even greater emphasis by the electric utilities on commercial development. The sales dreams of our executives of 1906 have long become commonplaces in utility selling. Your commercial executives should be commended for their praiseworthy accomplishments. The last decade has unfolded greater executive interest in business-building than ever before. Let it permeate to the office boy. And then, why not augment selling forces to include every dealer in electrical appliances and equipment? Inspire them to join in local profit-selling plans with wholesalers and manufacturers in order that the greatest number of consumers will be sold on more abundant household electric service.

In the commercial ranks of the utility industry we have the intelligence, the selling technique, the energy, the leaders and the loyalty to "lick" any competition. We must continue to remain in the vangard of industries earning merit for outstanding sales achievement. There is no better reference book for those who lead Government effort to build sales, than the constructive record of sales achievement of the electric utility companies.

Chief Executives of our industry! Give your commercial executives the money for promotion and selling of equipment and service commensurate with other private industries; likewise important, give them your personal support and share their spirit of optimism, and you may be confident that many of the obstacles that now lie in your path will be surmounted to the honor and profit of your companies.

Accounting Elaborations

(*Continued from page* 278)

we may perhaps visualize the full import of the proposed provisions. Distribution property lends itself to, and the property record method should be, a program of keeping summarized quantity totals and average costs for the different types of equipment, in the same manner that we do in our storerooms.

What is the purpose behind all these proposals, much of which is unsound under the cost vs. economic value test? The answer can only be that the proponents, without an adequate or practical understanding of the problems and costs involved, believe the information would be nice to have, although the assigned reason is that the data will assist and expedite rate cases. Let us examine this "reason" in the light of present day practices. We all know, of course, that the time tested method of careful and accurate cost findings, determination of fair value and fair return, etc., has been replaced by the "yardstick" and P.W.A. loan threat method of "rate-making." Under such circumstances Commission representatives advancing rate making needs in justification of such costly proposals can be accused of something difficult to define. Our only recourse is to apply a rigid cost vs. value test to each separate proposal and strenuously resist every one which fails to pass the test. Should this be done, the large amount of chaff will be eliminated and the remaining grain will represent a valuable addition to public utility accounting processes.

In closing let us consider the subject as it applies to ourselves.

In this present day welter of proposed classifications and accounting refinements —fantastic and otherwise—the possibility of receding rather than advancing, of simplifying rather than complicating, seems to have been completely overlooked. We must admit that many of of us have been guilty of a similar failure to think of consolidation rather than subdivision and have injected refinements, pet schemes and other elaborations into our accounting processes which would fail to meet the test of cost vs. economic value.

The vast amount of time which has been devoted to proposed classifications in the last two years will be found to have been a good investment if the final result is some improvement to our existing classification and the elimination of unnecessary refinements in our present accounting processes.

Report of the Prize Awards Committee

By Frank W. Smith

Chairman, Prize Awards Committee, Edison Electric Institute

Presented at the Fifth General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 4th, 1936

THE Edison Electric Institute has had the privilege of being the sponsor for eight prize awards during the past year, which have been established by the donors to encourage and promote progress in the electric light and power industry.

The Awards comprise first, the *Charles A. Coffin Medal,* awarded in recognition of a distinguished contribution of a public utility operating company. The second group includes those in recognition of outstanding accomplishments by companies in specified activities. They are the George A. Hughes Award for the greatest contribution to the development of the domestic electric cookery load, the Augustus D. Curtis Award for the greatest contribution to the advancement of artificial illumination of Commercial and Public Buildings, and the Thomas W. Martin Award for accomplishments in rural electrification. The third group includes prizes to individuals for essays on subjects relating to the electric light and power industry, embracing the *H. M. Byllesby Prizes, B. C. Forbes Prize, A. L. Lindemann Prizes* and the *James H. McGraw Prizes.*

The Committee is gratified to report that 250 papers and exhibits were submitted by employees of 106 companies in 42 states, Canada and one presentation from Spain in the competition for the several prizes. These papers have been on display during the Convention. It is hoped that many of the delegates have had opportunity to examine these presentations and that the display would create further interest in the awards, particularly on the part of the Executives in encouraging their employees to enter contests for next year's prizes. These papers, like those submitted in previous years, will be on file at the Institute Headquarters, where they may be examined, and they will be loaned to member company representatives upon request. The many valuable contributions brought forth through these contests will be reproduced in the E. E. I. BULLETIN.

The presentations have been reviewed, evaluated and the winners selected by a separate group of three judges for each award, each of the judges being an outstanding representative in the respective fields of the awards. The Institute and your Committee are greatly indebted to these gentlemen who so willingly performed this very laborious task.

MR. SMITH

It is with pleasure that the Committee announces the results of the contests. I am going to ask each winner, as his name is called, to step to the platform and receive the award direct from the hands of the donor, or his representative, who have very kindly consented to be on the platform for this purpose.

The Charles A. Coffin Award

The Charles A. Coffin Medal, under the terms of the Charles A. Coffin Foundation, established by the General Electric Company, to pay tribute to that great leader in our industry, the late Charles A. Coffin, is awarded to that company which, during the previous year, has made a distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry. The award to be made today is the twelfth award of the medal, which was created in 1922. Winning this medal is a signal honor and properly so regarded.

In the annual competitions for the award since its inception, a total of 119 presentations of accomplishments have been submitted. These records of achievements have been preserved and are on file at the Institute offices. They are of inestimable historical value, setting forth as they do the remarkable progress and growth of the electric light and power industry.

Exhibits for the Charles A. Coffin Award for the year 1935 were submitted by four companies. These have been on display during the Convention and will be loaned to any member of the Institute for more detailed study. It is hoped that the membership will take advantage of this opportunity. In making the award this year the judges found themselves confronted with an unusually difficult task. All of the presentations submitted were excellent, two of them especially so. Each company in its particular situation had made a remarkable record well worthy of the honor of receiving this coveted medal. Because of widely different conditions under which the two companies operated, it was difficult indeed, after evaluating the accomplishments of the companies as presented under the conditions of the award, for the judges to reach a choice, so outstanding were the achievements of these companies each in its respective situation.

The winning company presents a notable record for 1935. Its achievements constitute a distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry. This small company, serving a population of only 190,000 with less than 44,000 customers thinly distributed over a strip of territory stretching over a distance equal to that from Boston to Baltimore, has displayed noteworthy ability and ingenuity in building a power system and an organization admirably suited to the needs and conditions of its territory. By engineering skill and well-planned, en-

ergetic sales effort, it has achieved a high standard of electric service at remarkably low rates.

Serving an area, the population of which depends for its economic existence primarily upon the use of water for irrigation, this company has taken a leading part in the coordination of water and power developments in its territory to assure the highest utilization of water resources for the overall benefit of the people of that area. In this it affords an excellent example of the various ways in which electric utility companies can and do contribute to the good of the public which they serve.

It gives me pleasure to announce the unanimous decision of the committee of judges, consisting of Dr. Karl T. Compton, President of the Massachusetts Institute of Technology; Thomas N. McCarter, President of the Edison Electric Institute, and the speaker, which awards, for outstanding accomplishments during the year 1935, the Charles A. Coffin Medal, the certificate of award and the cash prize of $1,000 for use of the employees' benefit association, to the Idaho Power Company, Boise, Idaho.

Mr. K. M. Robinson, President and General Manager of this organization, is here, and I would ask that he please come forward to receive the award from Judge C. W. Appleton, Vice President of the General Electric Company.

The Augustus D. Curtis Award

A certificate donated by Mr. Kenneth Curtis, Chairman of the Board, Curtis Lighting, Inc., in memory of Augustus D. Curtis, the founder and first President of that company, to the public utility operating company within the United States which, during the twelve-month period ending March 1, 1936, has shown the greatest contribution to the advancement of Artificial Illumination of interiors or exteriors of Commercial and Public Buildings, and a cash prize of $250 to the individual or individuals responsible for the achievement.

The judges for this award were Dean Joseph W. Barker, Mr. H. B. Dates and Mr. Ely Jacques Kahn.

There were 19 presentations submitted in competition for the Curtis Award, and it is of interest that an excellent exhibit with a record of accomplishment was submitted by Compania Barcelonesa de Electricidad, Barcelona, Spain, but the company was not eligible under the rules of the contest.

The Augustus D. Curtis Certificate has been awarded to the Metropolitan Edison Company, Reading, Pennsylvania, which earned this honor through development of an electric lighting service activity which was outstanding in its accomplishment. There was a broad approach to the problem covering the technical, educational and commercial phases of the advancement of better illumination in commercial and public buildings.

Mr. E. J. Ingram, Lighting Director of the Metropolitan Edison Company, is here, and I would like him to step forward and receive from Mr. Darwin Curtis, President of Curtis Lighting Company, the certificate for his company and the cash prize of $250 which is awarded to the individual responsible for the achievement.

The George A. Hughes Award

A trophy donated by Mr. George A. Hughes, President, Edison General Electric Appliance Company, Inc., to the Public Utility Operating Company showing the greatest contribution to the development of the Domestic Electric Cookery Load, through promotion or selling, or both, during the year 1935, and cash prizes totaling $1,000 to the individuals responsible for the achievement.

Under the terms and conditions of this award, the cash award of $1,000 is to be divided as follows:

$500 is awarded to the Commercial or Merchandising Executive responsible for the achievement, and $500 to be divided among the retail sales directors and retail salesmen by the Commercial or Merchandising Executive, in proportion to the extent they have contributed to the company's activity in the promotion of the electric range.

The award further provides that where a company is not engaged in the actual merchandising of electric ranges, the second $500 may be distributed at the discretion of the commercial executive either to members of his department working with outside agencies or to the agencies themselves.

The judges of this award—Mr. Shelley Tracy, Mr. L. E. Moffatt and Prof. Paul H. Nystrom, were guided in their selection of the winner by the following terms of the award:

1. Highest percentage of Electric Ranges (5 KW or over) connected during the contest period in proportion to the total number of wired homes not using Electric Ranges at the beginning of the contest period. This applied to all sales in the community, and the replacement of obsolete, inefficient type of ranges was considered.
2. Creative sales and advertising plans.
3. Effectiveness of cooperation with agencies outside the actual merchandise department of the Central Station, to promote the sales of electric ranges.

It gives me pleasure to announce that the Kingsport Utilities, Inc., Kingsport, Tennessee, is the winner of the George A. Hughes Award.

The judges in the Hughes Award this year had a most difficult task and wished that two or three prizes might have been available instead of one. The terms and conditions provide a definite guide for estimating comparative merit. Although another company than the winner recorded slightly higher net increase in results, the completeness of the plan of promotion and selling, and the method of presentation brought the first prize definitely to Kingsport Utilities, Inc., at Kingsport, Tennessee. Although this is a small company the record of its achievement indicates what can be accomplished by plans well conceived and skillfully operated.

Mr. Carl A. Thornburg, General Manager of the Kingsport Utilities, Inc., is here and I would ask that he please come forward to receive the award from Mr. George A. Hughes.

The cash prize of $1,000 is awarded to Mr. J. E. Wright, Commercial Manager, as the individual responsible for the achievement to be distributed by Mr. Wright within the terms of the award.

The Thomas W. Martin Award

A bronze plaque donated by Mr. Thomas W. Martin, President, Alabama Power Company, to the public utility operating company within the United States showing the greatest contribution to the advancement of Rural Electrification during the year 1935.

There were no presentations submitted for the award this year and I fear our Committee has failed to do a good publicity job during the past year. Certainly there have been accomplishments in rural electrification.

The H. M. Byllesby Prizes

Three cash prizes—one of $100, one of $50, and one of $25, donated by Byllesby Engineering and Management Corporation, in memory of Colonel H. M. Byllesby, for the three most meritorious papers on any Accounting Subject relating to the electric light and power industry.

The judges for this award were Dean

John T. Madden, Mr. B. F. Braheney and Mr. William Paxton Little.

First prize has been awarded to Mr. H. D. Anderson of the American Gas and Electric Company, New York, for his paper: "The Accounting Future in the Electric Public Utility Industry under Public Utility Act of 1935."

Mr. Anderson was the winner of the first prize in 1931 and it is unfortunate that, because of illness, he is unable to be present to again receive this award. His prize will be mailed to him.

The second prize goes to Mr. Charles L. Betts, Jr., of the Westchester Lighting Company, Mount Vernon, New York, for his paper entitled: "A Code for the Determination and Application of Costs to Units of Property on Underground Conduit Systems."

Third prize has been won by Mr. Walter Bergmann and Mr. Henry G. Wingardner of The New York Edison Company, Inc., joint authors of the paper entitled: "Development of Clearing and Apportionment Accounts."

The judges also indicated that Honorable Mention should go to Mr. August E. Munich and Mr. Chadd H. Chase of the Brooklyn Edison Company, Inc., joint authors of the paper entitled: "Accounting Requires Engineering."

The B. C. Forbes Prize

A cash award of $250, donated by Mr. B. C. Forbes, Editor, Forbes Magazine, for the most meritorious paper dealing with the subject of Public Relations in the Electric Light and Power Industry.

There were 110 papers submitted in competition for this prize. The outstanding quality and merit of a number of the papers submitted made the awarding of this prize a difficult task. The judges, Mr. J. F. Owens, Mr. Britton I. Budd and Mr. D. C. Green, after careful consideration awarded the prize to:

Mr. Louis F. Conti of the Westchester Lighting Company, Mt. Vernon, New York, for his paper: "Preserving the Industry by Better Public Relations."

The judges deemed it fitting to award Honorable Mention to:

R. L. Laudenslager and A. C. V. Diehl.
Brooklyn Edison Company, Inc., co-authors of a paper entitled: "Utility Public Relations—Their New Era of Importance."

A. G. Mitchell,
Philadelphia Electric Company, for his paper entitled: "Goodwill Foundations."

J. B. Ellsworth,
Edison Electric Illuminating Company of Boston, for his paper entitled: "Decentralization and Local Management."

R. E. Kerns,
Oklahoma Gas & Electric Company, for his paper entitled: "Accent on Employee."

The judges, in notifying me of their decision, stated that

"* * * the committee is unanimous in feeling that the papers are of an unusually high order, in fact, some of them are in the nature of a treatise showing that profound thought and study has been given to the subject."

The A. L. Lindemann Prizes

Three cash awards—one of $150, one of $100 and one of $50, donated by Mr. A. L. Lindemann, President of the A. J. Lindemann and Hoverson Company, for the three most meritorious papers dealing with the advantages of electric cookery for domestic purposes.

The judges for this award were Mr. Earl Whitehorne, Miss Mildred Nichols and Miss Ada Bessie Swann.

This subject was especially attractive to the ladies. They submitted 23 of the 62 papers entered for the competition, and, as you will note, succeeded in winning all three prizes.

First prize was won by Miss Mayme E. Miller of the Minnesota Power & Light Company, Duluth, Minnesota, for her paper: "Advantages of Electric Cookery for Domestic Purposes." Miss Miller was winner of the third prize in the Lindemann contest in 1934.

The Second Prize was awarded to Mrs. Edna Parrish of the Utah Power & Light Company, Salt Lake City, Utah, for her paper entitled: "Advantages of Electric Cookery for Domestic Purposes."

Third prize was won by Miss Ruth Wilda Williams of the Detroit Edison Company, Detroit, Michigan, for her paper entitled: "Modern Cooking for the Modern Housewife."

The James H. McGraw Prizes

Three cash awards—one of $250, one of $150 and one of $100, donated by Mr. James H. McGraw, Honorary Chairman of the Board, the McGraw-Hill Publishing Company, for the three most meritorious papers on any Engineering or Technical subject relating to the Electric Light and Power Industry.

The judges of this award were Mr. R. H. Tapscott, Mr. L. W. W. Morrow and Mr. E. B. Meyer.

First prize awarded to Mr. R. M. Hanson of the Northern States Power Company, Minneapolis, Minnesota, for his paper: "Circulation in Water Tube Boilers."

The second prize was awarded to Mr. Elwood A. Church of the Edison Electric Illuminating Company of Boston, Massachusetts, for his paper: "Operation of Oil Insulated Transformers on a Temperature Basis." Mr. Church could not be present to receive his prize, which will be forwarded to him.

Third prize was won by Mr. Wallace C. Rudd of The New York Edison Company, Inc., for his paper: "A Method of Checking Current Transformer Connections to Multi-Element Watthour Meters by use of a Portable Cathode Ray Oscillator."

Edison Electric Institute Medal

I wish to take this opportunity to report on the Edison Electric Institute Medal. The medal is awarded in recognition of the successful resuscitation of individuals suffering from electric shock, and to maintain and encourage interest in the training of employees in the use of the Schafer Prone Pressure Method of Resuscitation for the saving of life.

There have been 21 medals awarded to employees of member companies since the announcement made at last year's convention. Since the inception of the award in January, 1933, there have been a total of 38 medals awarded.

In accordance with the terms of the award, these medals were presented by the managing or other responsible executive of the recipient's company at group meetings, safety rallies and other large gatherings of employees and their friends.

Finally; the Committee desires to express its appreciation to the donors or their representatives for their presence here; to the company executives for their attendance to receive the awards on behalf of their company; and to thank the executives of those companies who found it possible to arrange for the attendance here of the individual winners of the prizes.

The Committee is particularly grateful to the donors for their generosity in offering these awards.

Appreciation is also expressed to the individuals who took part in the contest. It is hoped that those who were not so fortunate as to win a prize this year will try again.

On behalf of the Prize Awards Committee, and I would like to say here that the other members are Mr. Thomas N. McCarter, your President, and Mr. James E. Davidson, I congratulate the winners of this year's prizes and thank you for your attention.

Review of the Utility's Position in the Air Conditioning Field

By C. E. Michel

Vice-President, Union Electric Light and Power Company, St. Louis, and Chairman, E.E.I. Air Conditioning Committee

An Address before the Fourth General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 3rd, 1936

WE have arrived at a point in the development of air conditioning where generalities may be dispensed with and where well defined policies, tested practices, and actual experiences may be examined and substituted therefor.

We are dealing with standardized practical equipment that is out of the experimental stage, both as to theory and product. We have reached a point where we can determine, with considerable accuracy, the extent and the type of the several markets that present themselves. We can measure the substantial progress so far made. We are in a position to state what air conditioning will and will not do, and to predict with confidence the investment and operating cost for a particular job in hand. Hence, in discussing the position which the utility occupies in this new field, we do so in the light of lessons learned from previous promotions of new uses of electricity, as well as in air conditioning itself.

There are few modern developments in the electrical field that touch the interests of the utility at as many points as does air conditioning. The basic consideration justifying the utility's participation in developing this business is, of course, the opportunity it presents to open up a broad new field for the sale of energy, but when, in fulfilling our obligation in this respect, we, at the same time, render a service to our customers that earns an exceptionally high degree of appreciation, we are confronted with an opportunity worthy of our best thought and effort.

Many of the services we render are either taken for granted or are of a workaday nature which fails to greatly excite public enthusiasm. Air conditioning, however, not only has an inherent fascination for the public mind, but begets a definite customer consciousness of a utility service that to him is most welcome and valuable. I am sure that other

MR. MICHEL

companies have shared our experience in receiving repeated expressions of gratification from customers using air conditioning, accompanied in many cases by equal appreciation of its moderate cost.

When high temperatures and humidity occur and there is serious illness in the home, or where little babies or elderly people in failing health would otherwise acutely suffer, appreciation of this service rises accordingly. The tangible and highly personal effect of air conditioning, whether it be in the home or in the place of business, is a good will builder hard to match.

In the experience of every utility there exist precedents that can be utilized in the promotion of air conditioning. We need cite only one familiar example—the electric refrigerator. Already the growth of air conditioning indicates that its acceptance is following the early trend of domestic electric refrigeration, which, after a brief promotional stage, leaped into public favor so suddenly as to take even the most optimistic by surprise.

It is hardly ten years ago that my own company agreed to display a domestic electric refrigerator on our merchandising floor, but refused to sell the gadget to the public. Today we have a refrigerator saturation well in excess of fifty per cent.

We learned a lesson from that experience, and when in 1931 a satisfactory self-contained room cooler was not available, we set up our own experimental laboratory, assembled parts and were prepared to go ahead with the building of such apparatus, for sale to our customers—a plan abandoned when a suitable unit was placed on the market well ahead of schedule.

Our confidence in air conditioning has been rewarded. During the past twelve months, we have picked up more than 5000 kilowatts of air conditioning load, and that in a period when 5000 kilowatt loads were not any too common.

Self-contained air conditioning units are available at prices relatively lower than were refrigerator prices at a corresponding stage of the refrigerator's acceptance. That in itself indicates that air conditioning is no longer a mere potentiality. It is a reality in a relatively advanced stage of acceptance.

The whole range of our experience with domestic appliances is applicable; so, too, is the promotion that has been successful in the commercial lighting and power fields. It calls for the selling of personal comfort and well-being, and it will respond to the appeal of trade stimulation. It can be sold in terms of increased industrial efficiency, which has long been the keynote of our industrial power sales.

But summer air conditioning has one advantage possessed by few of its predecessors in the electrical field. It is not being sold to supplant some less effective means to the same end, as were most of the appliances whose popularity

we have helped to create. It is a new service to humanity, a contribution to the comfort and well-being of those who make use of it.

We are dealing with a practical and proven product, using long established principles. Ventilation and air circulation are old arts. Air cleansing and humidification are familiar processes. Heating problems are thoroughly understood. Air conditioning applies these fundamentals in a new way perhaps, but nevertheless it is backed by our long experience in all of these services and is firmly founded on established principles.

At the same time, air conditioning has emerged from the custom-built to the ready-made stage. In the beginning it was a part of the building industry. Each job was designed for a specific purpose and the equipment for each was assembled on the ground. Then, as applications were made to comparable structures, standardization became practical and today even the large installations are made up of standard factory-built units.

The self-contained unit developed since 1932 completed the transformation of air conditioning into a business which obtains a great part of its volume from the sale of standard factory-made products. It now has taken its place as a merchandising business.

The appeal of air conditioning is not confined to any one section of the country. In practically every large metropolitan area, a representative number of installations may be found. Small communities will respond likewise once the introduction of air conditioning in these communities is accomplished. Summer heat and discomfort strike throughout the country; they are not limited to the so-called "hot" sections. The necessity for winter air conditioning is equally widespread. In fact, the two balance each other nicely. There is a market in every part of the country, no matter what the characteristics of the climate.

The related field of ventilation provides an opportunity to capitalize further on the growing public consciousness of the condition of the air in which they live. This year, I believe, will be a banner year for the exhaust fan.

Nor is the market confined to any single class of customer. Homes, stores and factories alike are prospects. The domestic customer weighs the cost against the benefits of personal comfort and health. The store and restaurant justify the investment on the basis of increased patronage, while the factory pays for it through increased productive efficiency and quality of product.

Finally, we are not greatly restricted to any particular income level. Consider again the close analogy with the electric refrigerator, which has gained saturations well over fifty per cent by finding users in almost every income bracket. The air conditioning field is a broad and open one.

The setup that will prove most effective in a given locality requires careful consideration of local conditions. If retail outlets capable of doing the merchandising job are not established, and if local capital is not available to establish them, then the utility, in addition to the promotion job, will have to merchandise equipment in order to give the necessary impetus to the business. Local conditions must also determine whether the utility confines itself to sales of self-contained units, or enters the broader field of selling also the larger jobs, involving, as it does, dealings with many branches of the building trades industry. In territories where density of prospects is low, such a plan has attractive possibilities. Often in metropolitan areas substantial progress has been made in the promotion of large installations, but the sale of small equipment has lagged. Here, the utility can assume leadership by merchandising such equipment and proving through actual demonstration that there is a market for it.

As early as 1930, two classes of organizations were active in selling air conditioning. One class consisted of merchandising outlets interested in small equipment; the other of engineering organizations interested primarily in the large jobs. By shouldering a part of the sales burden, the utility gained the cooperation of each of these; and by being impartial as to makes, interested only in sound standards and a satisfactory job, confidence on the part of the public, as well as the vendors, was retained. As the field grew, additional firms entered the business, were welcomed and assisted wherever possible.

Such experiences have shaped the policy now followed by many utility companies. Where conditions change, these policies change; but whether the utility merchandises equipment or not, a sales job has to be done. Air conditioning must find acceptance among the utility's customers, and in promoting this acceptance, up to date no satisfactory substitute has been found for the utility. Where the utility is doing a real constructive job in this respect, I look in the future to a greater degree of cooperation on the part of manufacturers than has as yet been apparent, chiefly because the needs of the situation are just now making themselves apparent.

Your Air Conditioning Committee has closely followed and reported on the evolution of air conditioning sales methods. Data has been published in the Committee's reports for the past three years, which enables member companies to draw on the experience of others in advising customers on operating cost; and E.E.I. headquarters have now undertaken the task of gathering comprehensive statistics from all sections of the country in form standardized by the Committee, and will henceforth be the source of information on utility air conditioning statistics.

In the 1934 report, we were frankly groping as to how to present to you the picture of the industry. This report drew valuable and constructive suggestions as to what the utilities needed to know, and our 1935 report was devoted largely to factual data, so essential in building up a comprehensive sales plan. It also reported our first contacts with the manufacturers. This will be continued in our 1936 report.

The conclusion to be drawn from these is that the promotion methods used by a great many different companies are strikingly similar. It was recognized in the early stages of the promotion that air conditioning must be felt to be appreciated, and as there were relatively few commercial installations to which the public had access, exhibits were established by the utilities. Many of these took the form of air conditioning installations on their own premises; others were merchandising exhibits; and in some cases demonstration equipment was installed on customers' premises—a plan that has had far reaching effects in developing new fields. Direct mail and newspaper advertising often made these exhibits the central theme.

This promotion has become a twelve months' activity, because during the winter the architect and engineer have more time to consider air conditioning problems than they have during the summer months, and it was found that prospective home owners were interested in looking over equipment prior to the spring building period.

To create a widespread use of air conditioning, we must sell health and comfort in the home and office. We must convince the merchant and the restaurant

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Home Cooling By Attic Ventilation

By W. G. Moore

Commercial Manager, Texas Power and Light Company, Dallas, Texas

An Address before the Fourth General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 3, 1936

IN man's early struggle for existence there was little time for seeking out artificial means of providing comfort, but dire necessity forced man to combat cold with heat. An indulgent nature put directly into man's hands the possibility of creating heat, and, from the beginning of time, man has created heat to promote comfort by combating cold. However, it is only within the last few years, with the introduction of mechanical refrigeration in small units, that we have been impressed by the possibility of promoting comfort through combating heat with cold. The study and consideration of applying refrigeration to homes and offices was the birth of air conditioning. The high cost of this type of refrigeration led our engineers into research for some more practical means of approximating the comfort of air conditioning. After a few years of experimentation, this idea has developed into what we term "Home Cooling by Attic Ventilation." It is sometimes called "night air cooling" because the temperature change is obtained by bringing the cool outside night air into the house in sufficient quantities to quickly cool the interior.

Home Cooling by Attic Ventilation is not to be considered as a substitute for a complete air conditioning system. It is an adjunct to a complete system, or if used alone, an economical means of securing relief from summer heat. This is secured through the practical application of the disc type exhaust fan that has long been used by commercial and industrial establishments. The sizes generally used are 36″, 42″ and 48″, operated by ¼ hp to ½ hp motors. The selection of the size to be used is governed by the total volume of the house in which it is to be installed. For satisfactory results it is necessary to change the air throughout the house every minute to a minute and a half.

The usual difference between the maximum and minimum summer daily temperature in Central Texas is 20 to 25 degrees or more. The average unventilated attic temperature exceeds the

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daily maximum outside temperature by 20 to 40 degrees. These homes are literally covered with a blanket of heat ranging from 130 to 150 degrees. This heat radiates into the rooms under the attic ceiling and makes them "as hot as an oven" most of the day and night.

As summer progresses, there is an increasing accumulation of heat in the roof, beams, attic, walls and furnishings. It is true that some lowering of the temperature of the home takes place during the night, but summer nights are too short to allow for an equalization of temperature. For this reason it is recommended that these ventilating systems be started early and used throughout the summer season.

Of course, the maximum cooling effect it is possible to gain is to reduce the inside temperature to the ambient temperature outdoors. Usually this maximum effect is not quite attained, but by Attic Ventilation we do reduce indoor temperature to within 3 or 4 degrees of the minimum outdoor temperature.

By cooling the home during the night we create a reservoir of refrigeration, which with forced ventilation of the attic during the daytime causes the home to remain quite comfortable throughout the day.

Let me emphasize, however, that Home Cooling by Attic Ventilation is most effective for night cooling, being limited for daytime use, at least in hot climates, to merely adding that comfort which results from air movement and ventilation.

The advantages of this method of cooling are:

1. An excellent job of cooling and of ventilation.
2. Low cost of equipment and installation, as well as low cost of operation. (Installation cost varies from $200 to $350 for an entire house.)
3. Simplicity of operation which can be made automatic by adding an inexpensive time switch.
4. The inconsequential costs of repair and maintenance of the equipment.
5. Flexibility of operation in that it can be used to cool and ventilate a single room or the entire home, by simply opening and closing windows and doors.
6. Elimination of the expense and necessity for providing sleeping porches in new homes. Every bedroom is in effect a sleeping porch in the homes that have Home Cooling by Attic Ventilation. The cost of a cooling system adequate for the entire home is less than the construction cost of a single sleeping porch.
7. Making possible the use of attic space for playrooms or for other purposes.

Our experience has pointed out very plainly and definitely that the application of this method of cooling has not advanced to the stage where it can be sold in a standard package. To prevent set-backs in its introduction into communities each case should be carefully studied by a specially trained sales engineer, or the equivalent, to insure:

1. Adequate fan capacity to give a complete air change in a one-story house of at least once a minute. In two-story houses the air change should be at least once in one and a half minutes.

This is considerably higher than the rate of air change recommended by some engineers and some manufacturers. Tests conducted at the University of Illinois Research Residence at Urbana, Illinois, show that maximum cooling effect can be obtained when the air is changed once in two minutes. Our experience, however, has proved the larger capacity to be essential

for Central Texas climate. Our reason for recommending the use of fans of larger capacity is to create an air motion of sufficient velocity to reduce the effective temperature during the daytime and the early evening hours.

(With air moving at the velocity of 500 ft. per minute, the effective temperature is reduced approximately 6 degrees.)

2. Proper location and design of grilles and attic outlets. With the type of construction existing in the Southwest, we have found it necessary, in most cases to use a single centrally located suction box, through which the air is drawn from the rooms and exhausted into attic space. The pressure built up in the attic space forces the air through louvered openings to the outside.

Grilles and outlets should be designed for a "free" air area sufficient to allow an air velocity not in excess of 800 ft. per minute.

3. Quietness in operation. Consideration of this is of utmost importance in selecting the fan and in designing the installation of the system. Since the speed of the fan blade is the most important factor in determining the noise of a fan, low blade speed is essential. In order to keep the cost to a minimum, consistent with good efficiency, we have used and recommended the use of a belt driven unit, with standard high-speed motors.

The power consumption of installation in use on our system ranges from 300 to 400 kwhr per season. Since most of those purchasing cooling systems are already liberal users of electric service, the added energy consumption is usually on the lower steps of the rate schedule, which makes the annual cost of operation range from $12 to 15.

If this system of cooling is as effective as is claimed, with low cost of installation and operation, you may naturally ask "Why have not more units been sold?" The answer, in my opinion, is:

1. This method of cooling was introduced with the beginning of the depression. During the past five years any item selling for more than $200 has been difficult to sell. Especially is this true of one that is new.

2. Until recently, there has been no extensive and well-planned campaign to promote its sale. A few utilities have individually carried on sales activities as aggressively as limited sales budgets would permit. Neither the fan manufacturers nor the utilities have realized the sales possibilities of this type of cooling and consequently adequate equipment and sales promotion have been lacking. I know of one large manufacturer, however, who is convinced that there is a good market for this equipment and who, this year, has scheduled a production of 5000 fans. He is also spending $50,000 on sales promotion in the South.

To approach this market in an effective way, on a national scale, it will be necessary, in my opinion, for the manufacturers and utilities to combine their efforts in going after this business.

In a cooperative sales plan the manufacturers should undertake to do the national advertising, to establish dealer sales outlets, and to provide for the training of dealers' salesmen.

The utilities should provide the sales personnel and local advertising to sell the idea of Home Cooling by Attic Ventilation to their customers and should assist local dealers in making sales of equipment. The utilities should certainly take the responsibility of promoting the sale of this method of cooling with the architects, contractors and real estate development companies in an endeavor to have the plans and specifications for all new homes include Home Cooling by Attic Ventilation. Where it is not possible to have a complete cooling system included in the plans and specifications, then at least provisions should be made for attic louvers and for framed openings in the hall of the proper size for a grille, for future use. The framed opening may be covered with the hall ceiling material, until such time as the cooling system is installed. This will add practically nothing to the cost of the home and will make the later installation of a Home Cooling System very inexpensive.

If all new homes were provided with grilles and with louver outlets in the attic, the sale of this system of cooling would be greatly simplified, because it could then be merchandised as a package job. The big market for this system of cooling is, of course, in existing homes where we find all types and kinds of houses, making each installation an individual construction problem requiring accurate cost estimates before a price can be quoted. As we gain more experience in making installations, it may be practical to classify buildings into some three or four general groups, according to type, and make a flat price for each class of homes for a complete installation ready to run. This will greatly simplify the sales problems. Where the utilities sell only the fan and depend on the carpenter, contractor or other tradesmen to make the installation, many complications arise which make the closing of the sale slow and difficult. On account of the amount of construction work to be done, the cost of which is from 33 1/3 to 50% of the cost of the fan, and on account of the need for specialized mechanics in making an installation, the sale of the equipment seems to naturally belong in the hands of specialty dealers.

In the initial stage of the development, however, the utilities may find it necessary to sell and install the equipment, as we have done, because dealers cannot be found who are willing or who are financially able to bear the cost of promoting the sale of the first few units which are necessary in each locality before there is a general enough acceptance of the idea to make sales profitable.

As an aid to sales, it may interest you to know of a scheme we use. This proposition is plainly a case of "seeing is believing." One installation to which the public has access is worth many, many pages of advertising or salesmen's talk. Our company operates through thirty-four separate districts, each of them under the supervision of a local manager. We proposed to our managers that if they would equip their homes at our cost with this system, we would allow them $1.00 per demonstration; that is, for every prospect whom they reported as having been taken through their homes and shown the workings of this system, we would credit them $1.00 on their account. I am telling you this as a hint of one means of providing demonstrations. That a demonstration is the best selling agent can be verified by innumerable instances. An example—one of our officials, only this spring, put an installation in his home, hurrying the job somewhat that it might be ready for a group luncheon which was to be given there by his wife. Twenty-four ladies sat down at the table, out of which number, two asked that salesmen be sent to their homes as they were convinced they wanted to have installations made.

Our opinion is that Home Cooling by Attic Ventilation presented as nature's method of cooling will appeal to the imagination of the public, and that, especially in the South, it will prove to be the most generally accepted method of home cooling.

The available market is certainly comparable to the market for electric refrigeration which has reached the saturation point in the Southwest 33 1/3% or 360,000 units. If Home Cooling by Attic Ventilation only reaches 50% of the present saturation of home electric refrigeration, it will add a load of 60,000 kw, with an estimated annual revenue of $2,160,000. If the same analysis be applied to the United States, we would have a load of 1,280,000 kw, with an estimated annual revenue of

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Unit Air Conditioners

By R. H. Tillman

New Business Manager, Consolidated Gas, Electric Light and Power Co., Baltimore, Md.

An Address before the Fourth General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 3rd, 1936

SINCE air conditioning first attained prominence in the public consciousness and began to exert a definite appeal as a means toward a more comfortable and pleasurable life, manufacturers have striven to produce equipment which would enable them to capitalize the maximum sales possibilities inherent in this modern development.

Marketing history was made in the sale of cash registers, automobiles, electric refrigerators and other mechanical devices, and the agencies responsible for the manufacture and distribution of air conditioning apparatus naturally determined that, where climatic conditions justified, its marketing should proceed along similar lines.

During the past six years a tremendous amount of work has been done in improving, simplifying and standardizing equipment and systems. In the course of this evolution, a number of small pieces of air conditioning apparatus have been developed, the design of which has been directed to the ultimate objective of our merchandising age; that is, a standardized article, which could be sold through regular trade channels, at an established price low enough to provide the comforts of air conditioning for people of moderate means.

The purpose of this paper is to discuss the present status of Unit Air Conditioners, their importance as load building equipment and their relationship to the future of the air conditioning industry. It seems doubtful if they will radically change air conditioning from the engineering-contracting activity that it is today. There is no question, however, but that they will have considerable effect in spreading the desire for, and the use of, air conditioning.

Unit Air Conditioners may be divided roughly into two classes. First are those small standard air conditioning units in which the refrigeration for summer conditioning and the steam for winter heating is supplied from an external source. Second are the self-contained units which

MR. TILLMAN

are equipped with a refrigeration compressor mounted within the unit casing proper, complete and ready for operation after the necessary electrical and water, drain or outdoor air connections have been made.

While there may be a large potential market for the self-contained Air Conditioning Unit, it is impossible at this time to judge the extent of such a market. In any attempt to appraise the market possibilities, consideration must be given to certain features that differentiate this equipment from other specialty items. The first and most important feature is that the self-contained Unit Air Conditioner does not do a complete job the year 'round. It provides comfort cooling for a single office, a living room, or a bedroom, whereas the customer's establishment usually consists of a suite of offices, or includes a general office, or comprises an entire residence.

As a stepping stone to a complete installation, the Unit Air Conditioner should prove most valuable. As an end in itself, it falls short of supplying the need, and rendering the satisfaction that the average individual who can afford such improvements will naturally and finally demand. The exceptional cases, where self-contained units fulfill the complete requirement, such as in professional offices, etc., will be discussed later in more detail.

In a discussion of either type of air conditioning equipment it is well to bear in mind one salient fact. The predominant feature of air conditioning is summer cooling and dehumidification, and this requires the use of refrigeration. A refrigeration compressor is simply a heat pump, and the heat that is removed from the space being cooled must be disposed of either to cooling water from the city mains or to air passed over the condenser coil.

Because of the quantity of heat handled in air conditioning, the problem of its disposal is a serious one and is a factor that definitely limits the portability of any air conditioning equipment. Before discussing this factor further, it is well to mention that relatively large quantities of power are required for the heat pumping work done by the refrigeration machine and for the operation of the circulating fans which handle the air that is being cooled. Therefore, the matter of supplying power to operate unit air conditioners is not a simple one. It usually necessitates the installation of separate circuits back to the nearest distributing panel.

The dissipation of heat from condensers can be accomplished by either of two methods. The first is to dispose of it to tap water, which is then discharged to the sewer. Due to the relatively low temperature and high heat capacity of water, the use of this system of heat disposal permits lower condenser temperature and therefore less power is required by the refrigeration compressor than is necessary if the second method is used; namely, disposal of the conden-

ser heat to outside air of relatively high temperature and low heat capacity.

The installation of a self-contained air conditioning unit equipped with a water-cooled condenser is complicated, however, by the fact that not only electrical connections, but also water supply and drain connections from the condenser must be made. Drain facilities must also be provided to carry away the water removed from the air during the process of dehumidification, which must flow from the evaporator coils by gravity.

Unit Air Conditioners having water-cooled condensers consume a relatively small amount of current, and certain designs have been developed which are suitable for use on 110-volt lighting circuits provided such circuits are not already loaded to capacity. Units, which require only 900 watts input for operation, have been designed to take care of small offices.

During the past two years the self-contained unit conditioner which uses air for condenser cooling has been brought to a marketable stage. These units have an obvious advantage in portability, since almost any room has a window which can be adapted to provide a source of outside air for condenser cooling purposes. Of course, it is necessary for the unit to be located directly in front of the window, which may present a disadvantage in some instances. Special removable fittings with alterable ducts connecting the unit to the window intake fixture have been designed for double-hung windows. A large fan, which usually operates from the compressor drive motor, draws outside air over the compressor and discharges it through the condenser coils and thence through the duct to the outside. The water which is removed from the room air in the process of dehumidification drops from the evaporator coil to a pan beneath the condenser coil, where it is picked up and thrown against the hot condenser surfaces by a spinner wheel. Thus, the water removed from the room air in the process of dehumidification is evaporated on the the condenser surfaces and carried out of doors by the discharge air from the condenser.

This method eliminates the necessity for a gravity drain to handle the condensate and also improves, by evaporative cooling, the efficiency of the air-cooled condenser. Units of this type to supply the average small office are available having power consumption that averages as low as 1100 watts. However, the compressor motor in most cases must be ¾ hp. or larger, so that it cannot be generally applied to 110-volt lighting circuits without disturbance to lighting. It is preferable to run a seperate 220 volts, single phase supply, which is a factor that affects to some extent the merchandising possibilities of these units.

Self-contained air conditioning units of sufficient capacity to care for the average small office or room in a residence, with either water-cooled or air-cooled condensers, are available today at prices ranging from approximately $400 F.O.B. factory, upward. Under favorable conditions, the cost of electric, water and drain connections for the water-cooled condenser type would probable be within $40, and the cost of running special circuits to supply current to the air-cooled condenser type would not exceed $25.00. One of the most desirable features of this equipment is the fact that it is virtually 100 per cent salvageable, so that it is readily salable to persons occupying offices, apartments or homes on a short-term lease basis.

These units are adapted for display on the sales floors of department stores and in utility company showrooms. Such displays, coupled with some general newspaper advertising and direct mailings to executive and professional classes should be productive of sufficient inquiries to form a basic prospect list. Any utility company should be willing to provide display space and should lend the weight of its name to any advertising campaign or, if necessary, inaugurate a campaign for the benefit of the merchandising agencies handling self-contained units. The equipment is well adapted for sales or promotion by companies that operate merchandise departments.

Sales solicitation can be made by specialty salesmen who, through the exercise of reasonable judgment, should be qualified to inform a prospect as to the total cost of installation with sufficient accuracy definitely to establish or to eliminate the sales possibility. While every application should be checked for heat load by an experienced engineer, this can be done quickly and easily and no extensive engineering data or estimates are necessary for the completion of the installation. Of course, it is essential that the equipment be properly sold and applied. Self-contained units are not adaptable to any but the smallest installations and careful control should be exercised over the sales agencies handling them to prevent their use in places where full satisfaction will not be obtained from the operation.

Because of their semi-portable nature, self-contained air conditioning units are not ordinarily equipped with heating coils, although heating coils are available in some makes which, when connected to a source of steam supply, will permit operation in winter as a heating and ventilating unit. One manufacturer is marketing a unit which embodies the reverse refrigeration heating cycle, which will provide an economical means of heating by electricity with outside temperatures as low as 40°. Such units may find wide application in the more southerly sections of the country.

The use of the self-contained unit presents the cheapest method of taking care of a single room or possibly two rooms. When more than two rooms are to be supplied, however, it is probable that a more economical installation can be effected by using unit air handling apparatus in connection with an external source of refrigeration. Such an installation has the advantage of permitting a real diversification of the refrigeration load between the individual rooms, which will permit the use of a compressor of a capacity smaller than the total combined unit capacity. This is particularly desirable from the standpoint of the public utility, since the operations will involve a lower peak demand with more full load hours. This condition will apply especially in residential installations where there is a high diversity in the use of rooms. For example, a residential installation might require two tons of refrigeration capacity and three units to take care of the first floor living quarters during the day. The second floor sleeping quarters could be supplied during the night by the same two-ton compressor operating on three units located in the bedrooms. The installation could be equipped with switchover mechanism to control such operation, and the full use of the compressor thus extended over the period when both the living quarters and the sleeping quarters are occupied.

The installation of air handling units provided with refrigeration from an external source is, however, an engineering undertaking. The individual units must be carefully sized to the load in each room and the refrigeration system must be accurately sized to the diversi-

fied load of the units. Refrigeration liquid and suction lines must be run from the central compressor location to each unit by skilled refrigeration mechanics. Each unit must be equipped with a drain for the disposal of condensate from the evaporator coils and it is usually necessary to insulate the refrigeration suction lines.

The air handling units in such systems do not have to be as compactly designed as self-contained units and accordingly it is practical to equip them with heating coils and humidifying sprays for winter use so that they will provide all the functions of air conditioning the year 'round. While this equipment is not portable, it may be installed with relative ease and lack of disturbance in offices or homes equipped with conventional radiator heating, and will thus make complete air conditioning available to a large market of users occupying existing structures.

With the self-contained unit, however, detail of installation has been reduced to a minimum. The equipment is simple and can be installed quickly at the request of the overheated customer who wants relief. This is particularly important because it is easier to sell a man air conditioning equipment in hot weather when he feels a pressing need for relief. A prospect is more willing to make the decision to spend money for comfort if he knows that he can have the unit delivered, installed and operating in from 12 to 36 hours. Self-contained units are available for immediate sale to prospects who would hesitate to buy if there were much delay between the signing of an order and the installation of the equipment.

The use of such a unit will give any individual a delicious taste of air conditioning, which will whet his appetite for a constant diet of it. The executive occupying an air conditioned office will find warm weather conditions at home almost unbearable, and having a remedy at hand, with which he has had definite experience, will be inclined to install air conditioning for his comfort during those hours spent in his home. Employees, who have occasion to use a conditioned executive office for conferences, will exert influence to have the general office space conditioned.

We have an example in Baltimore where, in the summer of 1933, air conditioning was installed in the private office of the president of a concern. In the summer of 1934, the application was extended to include the entire executive office floor, and in 1935, the concern installed air conditioning for their entire office building. Already, one of the executives of this concern has under construction a new residence which will be equipped with complete year 'round air conditioning.

It is natural for friends, business acquaintances and employees who find a practical application for air conditioning in a man's office or home, to feel that is feasible for them to have it too. Such an application is more powerful in creating desire than an installation in a department store or a motion picture theatre.

The possibilities of the unit air conditioner as a revenue producer still remain to be determined. Based on estimates of average weather conditions and actual tests of the operation of air conditioning systems in Baltimore, a unit air conditioner in the average commercial office should operate a minimum of 600 hours per season. Of course, the use in any particular case will depend upon the climatic conditions and the character of occupancy. As people become more accustomed to the benefits of air conditioning, and less conscious of operating costs, we may have to revise this estimate upward.

The power consumption of self-contained air conditioning units varies from a minimum of approximately 900 watts to a miximum for the largest unit now offered on the market of 2000 watts. The average of all installations will probably consume approximately 1100 watts, so that power sales of 600 to 700 kilowatt hours per season per unit installed may be expected. The self-contained air conditioning unit in a residence will probably not be used as many hours during the season as it will be in the average commercial office, for it is very difficult to confine the activities of a family to a single room. Single units in residence will probably be operated from 350 to 400 hours per season, though in the case of a unit used by an invalid or hay fever sufferer, the use may run as high as 1200 hours per season.

Residential installations involving the use of unit air handling equipment provided with refrigeration from an external source taking into account the full effect of diversity of loads in various rooms may be run from 1200 to 1500 hours per season. A system such as previously described with six rooms in a residence, taken care of in alternates of three rooms, would require approximately two kilowatts for compressor operation, and should result in the sale of from 2400 to 3000 kilowatthours per season.

Normal commercial applications using unit type air handling equipment with externally located refrigeration should operate approximately 700 hours per season, the kilowatt sales, of course, depending upon the size of the installation.

Summing up the various factors that pertain to Unit Air Conditioners, we feel that such equipment is not strictly comparable with other electric appliances such as refrigerators, washing machines, ranges and water heaters. There are elements in connection with its application and installation which place it in a category distinct from that occupied by the usual package-merchandise article. It is really one phase of the whole air conditioning-engineering activity and the attempt to divorce it from this and place it on a separate plane, while it may, to a certain extent, be possible, does not appear to be the most practical and efficient method.

For certain purposes, Unit Air Conditioners offer the ideal means of filling an air conditioning need. In doctors' and dentists' offices and other single offices, these units are practical and there should be large sales possibilities, because prospects of these general classes can usually afford the installation. There should be a substantial field for their application in homes although the possibilities here are more uncertain.

Home owners who are willing and able to make the investment required to air condition one or two rooms, will usually want a more complete application of air conditioning. For sick rooms, however, and in homes where there are invalids or hay fever sufferers, the self-contained Unit is a modern innovation that fulfills an essential need and is within reach of persons of quite moderate means.

The significance of the Unit Air Conditioner lies in its promotional possibilities and the fact that it gives us a suitable medium to supply small-scale requirements. If we can make full use of it in its proper place, without "overselling" it and without expecting it to be a panacea for all air conditioning needs, it will prove exceedingly valuable in bringing to the public mind the realization that air conditioning is available for general use now.

Relations of the Industry and the Rural Electrification Administration

By W. W. Freeman

Vice-President, Columbia Gas and Electric Corporation, New York, N. Y.

An address before the Third General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 3rd, 1936

THE Rural Electrification Administration was initially established by the President by Executive Order No. 7037 under date of May 11, 1935, and Mr. Morris L. Cooke duly appointed as Administrator. Copy of such Executive Order is as follows:

"By virtue of and pursuant to the authority vested in me under the Emergency Appropriation Act of 1935, approved April 8, 1935 (Public Resolution No. 11, 74th Congress), I hereby establish an agency within the Government to be known as the 'Rural Electrification Administration,' the head thereof to be known as the Administrator.

"I hereby prescribe the following duties and functions of the said Rural Electrification Administration to be exercised and performed by the Administrator thereof to be hereafter appointed:

"To initiate, formulate, administer, and supervise a program of approved projects with respect to the generation, transmission, and distribution of electric energy in rural areas.

"In the performance of such duties and functions, expenditures are hereby authorized for necessary supplies and equipment; law books and books of reference, directories, periodicals, newspapers and press clippings; travel expenses, including the expense of attendance at meetings when specifically authorized by the Administrator; rental at the seat of Government and elsewhere; purchase, operation and maintenance of passenger-carrying vehicles; printing and binding; and incidental expenses; and I hereby authorize the Administrator to accept and utilize such voluntary and uncompensated services and, with the consent of the State, such State and local officers and employees, and appoint, without regard to the provisions of the civil service laws, such officers and employees, as may be necessary, prescribe their duties and responsibilities and, without regard to the Classification Act of 1923, as amended, fix their compensation: *Provided*, That in so far as practicable, the persons employed under the authority of this Executive Order shall be selected from those receiving relief.

"To the extent necessary to carry out the provisions of this Executive Order the Administrator is authorized to acquire, by purchase or by the power of eminent domain, any real property or any interest therein and improve, develop, grant, sell, lease (with or without the privilege of purchasing), or otherwise dispose of any such property or interest therein.

"For the administrative expenses of the Rural Electrification Administration there is hereby allocated to the Administration from the appropriation made by the Emergency Relief Appropriation Act of 1935 the sum of $75,000. Allocations will be made hereafter for authorized projects."

FRANKLIN D. ROOSEVELT

The White House,
May 11, 1935.

MR. FREEMAN

During a six months' period prior to creation of the Rural Electrification Administration, a committee of the industry held numerous conferences with a subcommittee of the President's Power Policy Committee, of which sub-committee Mr. Cooke served as Chairman. The purpose of these conferences was to gather information, discuss viewpoints and cooperate in the development of plans to promote, on a sound basis, a more rapid expansion of electric service throughout the rural and farm areas of the country. It was realized that erroneous impressions could be gathered from inaccurate or incomplete information and that it should prove helpful to the officials of the Government if the experience and the facts within the knowledge of the industry were made readily available. Cordial acknowledgment has been expressed by Mr. Cooke of the assistance rendered in connection with the research and planning during and after the extended preliminary period which preceded the establishment of the Rural Electrification Administration.

Throughout the period of a year of official operation of the Administration the committee continued to maintain active cooperative relations with the Administration and with the companies of the industry in furnishing the information and suggestions as appeared appropriate from time to time.

The members of the committee were:

William Chamberlain, The United Light and Power Company

Thomas W. Martin, Alabama Power Company

G. C. Neff, Wisconsin Power & Light Company

P. H. Powers, West Penn Power Company

Hudson W. Reed, United Gas Improvement Company

H. F. Smiddy, Electric Bond & Share Company

W. W. Freeman, Columbia Gas & Electric Corporation (Chairman)

During the present session of Congress it became evident that the Federal Administration desired the passage of legislation to give the Rural Electrification Administration definitely outlined powers for a period of years. Bills that were substantially alike were introduced in the Senate and the House by Messrs. Norris and Rayburn. The Senate bill was promptly passed by the Senate without the granting of hearing, but the House bill was considerably amended after several days' hearings before the Interstate Commerce Committee. The Conference Committee of the Senate and House arrived at unanimous agreement and recommended a modified bill, which was passed and approved by the Presi-

dent, and Mr. Cooke was reappointed Administrator.*

Upon signing the Act the President sent a supplementary estimate to Congress calling for an appropriation of $1,460,000 for administration of the measure during the first fiscal year.

Since this serves to bring to a close the period of study and discussion between the industry and the Administration as to suggested plans of procedure, the industry committee has been relieved with thanks, by Mr. Cooke and has ceased to function.

Reports have been issued by the Rural Electrification Administration in the form of releases at various intervals covering approvals of loans and allotments. The latest such release, No. 70, under date of May 13, 1936 (about one year from establishment of REA), after reporting 16 additional allotments, states as follows:

"With these allotments REA has lent or earmarked a total of $12,108,412 to construct nearly 11,000 miles of rural power lines serving over 40,000 customers who have never before had central station electric service. The funds are distributed among 71 specific projects in 27 states, from coast to coast and from Canada to the Gulf."

A tabulation of all projects, as reported in releases to No. 70, is printed in the Appendix. It appears from the above figures that the average cost of line, including transformers, is $1,100 per mile. The average number of consumers served per mile of line is 3.63—farm or rural consumers.

The loan contracts to date are understood to be for a twenty-year term with interest at 3 per cent per annum and are payable on an amortization basis of monthly payments which, after the first year, during which interest only will be required, amount to approximately $5.75 per month for each $1,000 borrowed.

It is understood that the projects for which funds have been "earmarked" have been only tentatively approved, subject to the furnishing of further information or verification, and that final approval of the Administrator is in abeyance in the meantime. Also, it is understood, with regard to the projects for which loans have been contracted or definitely authorized, that the actual supplying of the funds in each case is dependent upon verification of the fulfillment of the various stages of progress as provided for in the contract.

That the Administrator has exercised deliberation and caution in the investigation of applications for loans and in the negotiation and drafting of contracts is indicated by comparison of the following official figures. Mr. Cooke reported on March 14, 1936, at hearing before the House Committee on Interstate and Foreign Commerce that "the present Rural Electrification Administration had applications for loans for rural electric line construction totaling approximately $93,000,000."

He also reported that the allotment of funds at that date, covering a total of 55 projects, amounted to $9,077,512, and that there were included in said amount 27 projects for which loan contracts had been made totaling $5,000,012. With regard, however, to funds actually advanced to the projects, Mr. Cooke reported to the Committee on March 13, 1936, as follows:

"It is a very small amount, a matter of, I should say at most, a couple of hundred thousand dollars."

Between the date of the hearings in March and the report of May 13th the combined loans and allotments increased to $12,108,412. An article in *Business Week* of May 16th states:

"Only about $250,000 has actually been spent so far."

Referring to the Rural Electrification Act of 1936, it will be noted that the grants and limitations of authority of the Administrator are quite clearly defined. The following provisions are of special interest:

1. The Administrator is authorized to make loans for rural electrification and the furnishing of electric energy to persons in rural areas who are not receiving central station service. All such loans shall be self-liquidating within a period of not to exceed 25 years and shall bear interest at a rate equal to the average rate of interest payable by the United States on its obligations having a maturity of ten or more years after the dates thereof, issued during the last preceding fiscal year in which any such obligations were issued. Loans shall not be made unless the Administrator finds and certifies that in his judgment the security therefor is reasonably adequate and such loans will be repaid within the time agreed.

2. The Administrator is authorized to make loans for the purpose of financing the wiring of the premises in rural areas and the acquisition and installation of electrical and plumbing appliances and equipment. Such loans may be made to any of the borrowers of funds for the construction of rural lines or to any person, firm or corporation supplying or installing the said wiring appliances or equipment. Such loans shall be for such terms, subject to such conditions and so secured as reasonably to assure repayment thereof. The rate of interest shall be computed the same as in the case of loans for rural lines.

3. The Administrator is authorized to make loans to "persons" and "corporations", which would include privately operated utility companies, but is instructed to give preference to cooperative and non-profit organizations. Loans are authorized for the purpose of financing the construction and operation of generating plants as well as electric transmission and distribution lines, but "no loan for the construction, operation or enlargement of any generating plant shall be made unless the consent of the state authority having jurisdiction in the premises is first obtained."

4. The maximum amount authorized to be appropriated by Congress for the Rural Electrification Administration is $40,000,000 for the fiscal year ending June 30, 1938, and for each of the eight years thereafter. During the fiscal year ending June 30, 1937, the Administrator is authorized to borrow up to $50,000,000 from the Reconstruction Finance Corporation, provided that such loans shall not exceed 85 per cent of the obligations constituting the security therefor. This requirement as to security for Reconstruction Finance Corporation advances would serve to limit the loans for rural lines during the first fiscal year to 85 per cent of the cost of such lines, excepting for the fact that the Administrator will take over the assets of the initial Administration, and the security for all such prior loans will be available for additional collateral to Reconstruction Finance Corporation. Therefore, the requirement of a 15 per cent margin of security for the Reconstruction Finance Corporation is a matter which will only affect the relations of Rural Electrification Administration and Reconstruction Finance Corporation, and the loans made to the rural projects will generally cover the entire investment costs.

5. The Act provides for an allocation of 50 per cent of the annual available funds among the various states in the proportion which the number of their farms not then receiving central station electric service bears to the total number of farms in the United States not then receiving such services; but, as unexpended or unobligated sums may be carried over to succeeding years, each allocation provision continues throughout the year only and the Act will permit the making of loans aggregating $410,000,000 during the ten-year period, if appropriations are made by the Congress from year to year for such purpose.

6. All moneys representing payments of principal and interest on loans made by the Administrator shall be covered into the Treasury as miscellaneous receipts. This will serve to prevent the use of moneys received in payment of loans and interest as a revolving fund for further loans.

7. The Administrator is authorized and empowered to bid for and purchase at any foreclosure or other sale, or otherwise to acquire, property pledged or mortgaged to secure any loans made pursuant to this Act; to pay the purchase price and any costs and expenses incurred in connection therewith from the sums authorized in section 3 of

* *Editor's Note:* The following material supplementary to this paper is available upon request to the Editor, E.E.I. Bulletin, 420 Lexington Ave., New York, N. Y.: Rural Electrification Act of 1936; Statement of the Managers on the Part of the House; List of Approved Loans for Rural Electrification; Status of REA Projects.

this Act; to accept title to any property so purchased or acquired in the name of the United States of America; to operate or lease such property for such period as may be deemed necessary or advisable to protect the investment therein, but not to exceed five years after the acquisition thereof; and to sell such property so purchased or acquired, upon such terms and for such consideration as the Administrator shall determine to be reasonable.

No borrower of funds under section 4 shall, without the approval of the Administrator, sell or dispose of its property, rights, or franchises, acquired under the provisions of this Act, until any loan obtained from the Rural Electrification Administration, including all interest and charges, shall have been repaid.

In addition to the definite provisions of the Act, it will be interesting to note certain interpretation of such provisions and explanations of policies by the Administrator. With this in view, the following quotations are offered from the official record of the hearings before the House Committee on Interstate and Foreign Commerce held March 12th, 13th and 14th, 1936.

Relative to the policy pursued by the Administrator in the examinations of proposed projects and conclusions as to their probable soundness or desirability:

"In the preliminary analysis of these projects, we obtain all pertinent data having a bearing on the cost of construction, cost of operation and maintenance, and cost of power, together with all available information concerning tax rates and the economic status of the territory to be served.

"Using all of the available data, an economic analysis of the project is made to determine the wisdom of making the requested loan. In this analysis, we balance expected income against expected expenses, taking into consideration every probable element of expense and checking these estimates against the cost data which have been secured through many years of operation of similar projects.

"Since all of our loans must be self-liquidating, one of the main points which we investigate is the ability of the proposed consumers to use and pay for electricity in their homes and on their homes and on their farms. The applicant is requested in making the application for the loan to state, after a thorough canvass has been made of the prospective customers, just what amount they can afford to spend each month for electric service and what additional amount they can afford to pay each month on installment payments for electrical appliances. This information is checked against Census Bureau publications and any other available material concerning the economic status of the particular community, county, and State in which the project is located.

"Consideration, of course, is given to the fact that within the past 2 or 3 years, low-cost but thoroughly reliable electric appliances have been made available by the manufacturers, and to the advantages of low-cost financing terms for wiring of the premises and the purchase of electric and plumbing appliances.

"It is usually found that the applicant for a loan from the Rural Electrification Administration has planned his proposed electric resale rate schedules so that they will induce a fuller and more thorough use of the service than has been usual in the past. In the light of the foregoing we are assured that load development in the areas to be served by these projects will be quite different from that which the electrical industry has been familiar with in the past, and that the load building efforts will produce greater and quicker results in increased use of electric service.

"In our analyses we do not restrict ourselves to any stereotyped or arbitrary standards of calculation, such as an annual consumption per customer or the ratio of construction cost to annual revenue, but rather work to determine just what are the prospects of the project being self-liquidating. In this way each project is given a thorough and individual analysis which in most cases is checked by an engineer's investigation in the field before the loan contract is signed.

"Funds are not released to the borrower until REA has finally approved the borrower's plans and specifications, together with all necessary wholesale power, construction, and operation contracts."

* * *

Mr. Cooke. I wish you could see the way we analyze projects, and the caution that is exercised constantly throughout our organization. It may interest the committee to know that there is a temptation now, on the part of the people who have not had very much experience in this line of work—some of them so-called business men—to come in and try to get loans from us to go into a business that they know nothing about, for profit. I think the industry will be very well advised to back us up in not making loans to that class of people.

The Chairman. Mr. Cooke, in the examinations that you make through your engineers, after an application is made, has been made, or will be made, if this bill should pass, you would go into the matter to such an extent that you would not approve a loan, to any sort of a set-up that business judgment did not dictate would be self-liquidating?

Mr. Cooke. Absolutely.

The Chairman. That is your answer as to the adequacy of the security?

Mr. Cooke. Absolutely. Under emergency conditions, we would have been culpable if we had not used every means in our power to get this work under construction, but if and when this legislation passes and we start in on a 10-year program, and I have anything to do with it, I am going to try and organize it in such a way that is will command 100 per cent of public confidence and be as rigorous in building up a technique as it is possible to be. And it will be quite different from what we have been doing.

* * *

Relative to estimated average use of 1200 kwhr annually by prospective consumers on rural lines.

Mr. Wolverton. In making allowances for the extension of electrification, to rural communities, do you contemplate the average use, as your present figures indicate of 870 kilowatts, or a greater amount?

Mr. Cooke. A greater amount.

Mr. Wolverton. Upon what do you base your thought that under your administration there will be a larger use than the past has shown by experience to be the case?

Mr. Cooke. Experiences in some parts of this country, and in other countries, but more particularly on our capacity, through the opportunity to educate. Now, when we first began discussing this matter with the private electric industry, we had some long continued conversations and negotiations with them. One of the principal points they raised, and the thing that gave them their interest, and I think still keeps their interest in this activity, is that Uncle Sam has an opportunity to carry on educational campaigns to a better advantage than any private industry has.

Mr. Wolverton. What do you contemplate will be the average use?

Mr. Cooke. Well, we have said over and over again in our publications, unless people use in the country an average of 100 kilowatts a month—1200 a year—that it is not rural electrification. Just lighting houses is not rural electrification, because you are not bringing to the farmer the drudgery-saving, the cultural opportunity and everything else that can go with rural electrification.

Mr. Wolverton. I assume that the present electrification system, now under the control of private enterprise, has covered the rural districts which will most likely prove remunerative. Are you of a similar opinion?

Mr. Cooke. I should say that it has included the lines that would be most remunerative rather than the districts.

Mr. Wolverton. Then, it seems, that the district which it is the purpose of your administration to cover, is that district which present facilities do not consider remunerative enough to cover?

Mr. Cooke. That is true where they have given any thought to it; but really, Mr. Wolverton, I think that the real reason why we have a small percentage of rural electrification in this country is that the industry has not given it much thought. That is perhaps negligible, but, they have engaged in other parts of the field. I am not disposed to criticize them for that; but just as a matter of fact, I do not know what the situation is in my State today, but in 1925 there was not a single electric salesman operating in rural Pennsylvania, not a single one.

Mr. Wolverton. They have evidently given thought to the construction of facilities in districts where it has returned a use of approximately 850 kilowatthours.

Now, if they have given thought to the areas that would only provide an average use of 850 kilowatthours, how do you account for the fact that they have not given thought to the areas which, in your opinion, would provide 1,200 kilowatthours?

Mr. Cooke. Well, just the testimony of the industry itself.

Mr. Wolverton. In other words, if the most remunerative of the possible fields have only shown an average use of 850 kilowatthours per year, what is there that you can point to that would indicate that in the area

not now served that there would be a larger average use?

Mr. Cooke. Well, I think that if the United States Government does not do another thing in this matter, the use is going to grow up, because in practically every State in the Union the cost of the service is coming down, the rates are being cut away beyond the savings in cost, and that in itself will bring up the use. In other words, it will move up from the average of 850.

Again, I use that figure with a great deal of reservation. Nobody can say positively, but it is as good a guess as any. It does not take much imagination to think of 1,200 as the average use, or 1,250—an increase of 50 per cent there again.

Mr. Cooke. Of course I may be over-optimistic in assuming that we are going to average between 860 to 1,200 kilowatthours, but I think I am very pessimistic in stating it that way.

One of my colleagues reminds me that domestic use has increased 40 per cent in the last 6 years.

Relative to the authority or policy of the Administrator with regard to rates:

Mr. Huddleston. Have you assumed, in the contracts that you have made, in dealing with the matter of terms, to specify the terms for the sale of current?

Mr. Cooke. We have not. Our provision is that such rates must be charged as will tend to satisfy the loan. But we have not gone into particulars, because it is an area in which we, under our conception of the law, have no authority. The setting of rates is entirely a State matter.

Mr. Huddleston. You have not attempted to limit the profit of these concerns?

Mr. Cooke. To limit the profits?

Mr. Huddleston. Yes.

Mr. Cooke. No; with this exception, that in certain instances, both cooperatives and private companies had come to us for loans where their rates were so obviously excessive. We have not been fussy about it, but I can remember several instances; for instance, one of a limited dividend company, and there have been cases of cooperatives and cases of private companies where the rates were so clearly excessive that it would have jeopardized our program had we made the loans.

But generally speaking we have not fussed with them; we have not made any effort to dictate with regard to rates, simply because we have no authority in the matter.

Mr. Huddleston. You have power under this Executive order to fix terms of loans?

Mr. Cooke. Yes.

Mr. Huddleston. If you chose to impose your ideas on them, you would have the power to do so.

Mr. Cooke. We have interpreted the Executive order in the light of our conception of the laws of the land, both Federal and State laws. I know, as administrator, that I am absolutely without power in the matter of fixing rates within the boundaries of a State. We have not attempted to do it.

Mr. Wolverton. At that point, may I refer to a provision that is in the contract? It is under section 1, article 2, entitled, "Duties of the Borrower Before the First Advance by the Government," and clause G reads as follows:

Delivery of a contract or contracts for the purchase by the borrower of electric energy at wholesale, which shall be subject to the approval of the administrator.

Mr. Cooke. That is wholesale. That is a very important matter. But it is an entirely different thing than the rate to the ultimate consumer. Obviously, we would be very foolish to make loans to any one until they had made a satisfactory arrangement for wholesale current. There is one State, for instance, where it is generally held to be true that current at wholesale should cost from 3 to 4 cents. Our conception of it is that that price is just about double what it ought to be. But we do not fuss on that. The borrower has to come and tell us what he is going to pay for wholesale, because without our knowing that and knowing the cost of his lines, we cannot tell whether it is a project that is going to pay out.

Mr. Huddleston. Where you have the power to make a loan or to withhold it, you have the discretionary power to fix terms on which to make the loan, do you not?

Mr. Cooke. We certainly have the power to refuse to make a loan. I would not want the position if I did not have that power, because there are a great many things that affect the validity of a loan, the chance of its paying out. We try to watch as many of them as possible. But we have been scrupulous with everybody, private companies and everybody else, in not insisting on anything except that Uncle Sam gets his money. I gave the committee yesterday some 30 sheets describing what we consider an approved, satisfactory type of distribution line. We hand that to our borrowers and tell them that that is our best guess but if they want to change it, to let us know how they suggest changing it, and they can go ahead.

Mr. Huddleston. I have no intention of questioning the policy. I just want to find out what the power is.

Mr. Cooke. You know, I think, and I certainly am compelled to know in the light of my experience, that we have no power inside of a State to regulate rates, and we have not attempted to do it.

Mr. Huddleston. Section 2 of the bill gives the administrator power to promote rural electrification and the furnishing of electric energy.

Sections 4 and 5 provide for the exercise of that power of promotion through the making of loans and give the Administrator power to fix the terms, in this language:

Such loans shall be on such terms and conditions relating to the expenditure of the moneys loaned and the security therefor as the Administrator shall determine * * *.

That is lines 7 and 8, on page 5.

I want to know whether that gives the administrator power to fix rates either a maximum or minimum. I think we ought to be certain what we are doing when we pass this law.

Mr. Cooke. I have some hesitation in saying to this committee what the law is. But I have absolutely none, speaking for myself as an individual or as administrator, in saying that we have no power to fix rates.

Mr. Huddleston. That comes back to what I said a moment ago, that the discretion to withhold a loan, gives power to dictate any terms on which the loan may be obtained. That seems obvious.

Mr. Cooke. The futility of attempting to do that seems to me obvious. Let us say that in a weak moment, a mistaken moment, I told some cooperative that they had to sell at a certain rate in order to get the loan. The loan was made. The public service commission of that State can change it the next day, if they want to.

Relative to obligations of projects to establish routine accounting methods providing for renewals and replacements as well as amortization of indebtedness:

Mr. Cooke. Well, I do not think we are in the position of being criticized here for having the Federal Government assist the States, because we work in cooperation with the public service commissions. We are not fixing rates. In the contract we simply state that the rate shall be such as to make the loan to the Government good. But I do think that the Federal lending in this thing is going to be a good thing, not only for the cooperatives but for the private companies. I think that the private companies very speedily are going to come to see this cooperative movement is really an assistance to them. I think that before many years they will welcome them just like the Bell Telephone System welcomed the private extension to their own system. I happen to be one of 14 owners of a rural telephone company in Bucks County, Pa. Perhaps we have 10 or 15 miles, and we hand the Bell Co. their toll business; perhaps the service is not quite as good as if it were a part of the Bell system, but they do not pay quite as much for it. The Bell Co. talks over with them the possibility of selling out, but that has been going on for years, and the service is perfectly satisfactory.

Now, take these cooperatives: In 99 instances out of 100 they are going to buy current from existing plants. I can say, for instance, that we have been operating now for 9 months, and while we have discussed occasionally building a new power plant, as a matter of fact we have not. We have been provided in every instance where we have gone with power either from a private or a municipal plant. So, I think they are going to look upon this legislation as simply adding another outlet to the national integrated power system. There is nothing in this to hurt them.

Mr. Merritt. Do you think under Federal operation that the farmer can afford to pay the rates which will pay the interest and the obsolescence which has to be taken care of on these lines? They will have to be renewed about every 15 or 20 years.

Mr. Cooke. Of course, that is taken care of, Mr. Merritt.

Mr. Merritt. And yet amortize it out in 20 years?

Mr. Cooke. Over a period of 25 years.

Mr. Merritt. 25 years?

Mr. Cooke. Yes.

Mr. Merritt. Do you think it is probable that at the end of 25 years that the United States will be the owner of a good many of these outfits?

Mr. Cooke. No; I do not think so, sir. Twenty-five years was suggested by the industry itself as the proper loan period. Of course, in the routine accounting we do not have to provide for that in legislation, because that is a routine matter that anybody,

building a line, would have to think of. As a matter of fact, while they may last more than 25 years it is more satisfactory to amortize the amount.

Mr. Merritt. I understand.

Mr. Cooke. But it is not all done at one time.

Mr. Merritt. Obsolescence, nevertheless, is a large item of expense.

Mr. Cooke. Certainly.

Mr. Merritt. In any manufacturing business. Now, do you think, just to get your general idea, that it would be a good thing, on the whole, if the Federal Government were to take over the electric business all over the United States?

Mr. Cooke. You are asking me that as a question?

Mr. Merritt. Yes.

Mr. Cooke. No; I should think it would be a calamity.

Relative to the question of the promotional activities of the Administration involving the initiation or encouragement of rural line projects:

Mr. Lea. Here is a situation where we invite the people to incur these debts.

Mr. Cooke. Here is a situation where what?

Mr. Lea. Where we invite people to incur these debts to finance their operations, like you have loaned to farmers, and they are asked to invest in this enterprise on the cooperative basis, without requiring any initial expenditure on their part. That suggests the question whether or not some contribution should not be required. Is there not a danger of inviting people unwittingly into investments they are not able to carry?

Mr. Cooke. Yes; I think there is, and we have been just as zealous as we could be in not doing it. In other words, the REA should not be in the position of going out and organizing people and then loaning them direct. We have refrained from doing that in every possible way.

We have depended upon local initiative. Where there was local initiative and they asked us for our cooperation we have given it. But we have been very careful not to get into a position in connection with the loaning of money where we could very easily get into a line of improper conduct.

Mr. Lea. It is not your policy to importune people?

Mr. Cooke. Quite the opposite. Everybody has instructions to lay off on anything of that kind, because it is too easy to get into something that would be very improper.

Relative to possible loans for generating equipment and policy of avoidance of duplicating and competitive lines:

Mr. Huddleston. Your conclusion, then, is that a small group of inexperienced farmers in a remote part of the country can set up one of these enterprises on a mutual or cooperative basis and construct a few miles of electric line, furnish engineering and purchasing services, and all of the things that go to make up costs, and could do that more economically than an enterprise already equipped with a staff of competent engineers and all of these other things.

Mr. Cooke. I believe in the cooperative. In a very short time we will find that that can be done, not only the construction but the operation can be done at a lower net cost than the private companies have. They have not got the overhead that the private companies have. There is nothing as I say here—I am trying to say it so as not to leave any impression with you or the public, that I am criticizing the private companies in this field, because I am not; but you must remember that these cooperatives are going to buy their current in practically all instances from existing plants, just as the cooperative and privately owned small telephone lines are adjuncts of the telephone system and go to give the telephone company their toll business. The line that I operate has a very heavy toll business that they give to the Bell Telephone Co. It brings about a very nice reciprocal arrangement.

Now, there are a good many stations already where the owners of the company have said, "God bless you," to the cooperatives. Their attitude is that they have the detail, the agony, and "We will sell the current at wholesale."

Mr. Huddleston. Is it contemplated by this bill that these lines will, or may, receive current from established utilities?

Mr. Cooke. Oh, absolutely. Take the record that we have already made. We have not built a mile of transmission line, and I think I am right that we are not even contemplating a single new generating system. All construction thus far is taking current from the existing establishments, and I think, of course, there will be cases where isolated remoteness necessitates it or where it may be desirable to put in a diesel plant, but we have already had applications from practically every State in the Union, and thus far there has not been one case—I want to be frank, there may have been one case which we are now considering which calls for a diesel plant—but it is only contemplated, and all of the practice thus far made and all development has been on the basis of using the current of private companies or other existing plants.

Mr. Huddleston. I am correct, am I not, in saying that the fundamental purpose of this bill is to give electric service to those who now have not that benefit?

Mr. Cooke. Those who do not now have it.

Mr. Huddleston. Yes.

Mr. Cooke. Yes, sir; we have made the practice, absolutely, Mr. Huddleston, of not building any competing lines. Our current only goes to farms and farm homes that do not now have it and where, in a few instances, it has been necessary for us to parallel an existing line in order to reach that market, we have made the rule that no current is to be taken off of that line. In other words, at no point have we competed with existing lines; and I will be glad to know if any member of this committee has heard in any State of a single exception to that.

Relative to forecast as to probable results in extension of electric service to farms over ten-year period:

Mr. Cooke. If you assume that 10 per cent of the farmers of the country have electricity now, I would expect that in the 10 years contemplated by this legislation, through private industry alone, they might get up to a total of 20 per cent. I would expect that with this legislation we might get up to 40 per cent. The additional 20 per cent would not be done entirely by the cooperatives, but it would be done because there would be some pressure on private companies to let out their best efforts. Their tempo now is quite different from what it was a year ago, and I should think that if we did not have legislation like this there would be a tendency to sink back to the former slower tempo.

A very recently issued pamphlet of the Administration, entitled, "REA Electric Service—At a Price the Farmer Can Afford," contains the following of the REA program:

"REA does not give anything away. It is a financing organization that lends money on equal terms to all agencies in a position to carry through a power-line construction project, rapidly and adequately. The agencies which build the lines will own them, subject in most instances to liens pending the payment of the loans. The agency operating a line will as a rule buy power at wholesale from a generating company, and resell the current to the consumers connected to the new line. The difference between wholesale and retail rates will pay for operating the lines, preparing bills, keeping lines in repair, insurance, taxes, interest, and repayment of the loan. There will be a definite provision for the repayment of every dollar, and the Government will have reasonable security covering 100 per cent of the funds advanced on projects.

"Under suitable conditions, REA lends the entire cost of building the lines. Loans are made on favorable terms. Borrowers are given 20 years to pay back the loans and the interest rate is very low—only 3 per cent. Security for the loans is usually the line itself and its revenues. No farmer is required to mortgage his property. No member of a cooperative is liable for debts of another member. There is no liability whatever on the part of the individual consumer except to pay for the current he uses.

"There are many items of expense growing out of the construction and operation of a power line. These become very burdensome unless they are shared by many consumers. In view of this fact REA cannot help bring electricity to a single isolated farm or small group of farms.

"It is impossible to make hard-and-fast standards which all projects must meet in order to get REA approval. The area to be served by the new lines should be more or less concentrated and compact. To be economically successful, a project should have at least 25 miles of line or serve at the minimum about 75 customers. Shorter extensions may be approved, if they are made part of an existing, self-supporting line.

"The lines should be planned to bring power to every possible consumer in the area. Rural electrification in the past has too often been brought only to those consumers who were close to existing lines or who were large users of power. The other farmers in the region were left to struggle along without electricity. REA is determined to include the 'skimmed milk' with the 'cream.'

"In many ways the cooperative method is ideal for electrical distribution. More and

more farmers are learning the benefits of economic organization and are buying and selling through cooperatives. Their effectiveness is creating new confidence in this type of enterprise. Electric service cooperatives, too, have operated successfully in this country for years.

"The Development Section of REA will advise cooperatives regarding methods of organization and operation.

"REA realizes that most of the electric light and power industry in the United States is operated by private interests. The private power and light companies are being encouraged by REA to cooperate in the program of electrifying rural regions.

"If you have a private utility near you, which you have not consulted, do so. We suggest you see its local manager and find out whether the company is able to help you. The company may be in a position to finance its own extensions, as many have done in the past year. If it cannot finance extensions to your neighborhood, REA is quite willing to lend money to the company if it offers reasonable security and reasonable assurance of a successful project."

In Conclusion

The foregoing may serve to give a fairly complete understanding of the activities of REA to date and the authority and policies under which operations are to be conducted during the ensuing ten years.

The sum of $40,000,000 which may be appropriated annually by Congress for the lending of funds by REA is to cover both the cost of rural lines and of wiring, electric appliances and plumbing on the premises of consumers. It is estimated that the cost of wiring and appliances may about equal the cost of the line extensions. Therefore, if the prospective consumers should avail themselves generally of the loan privileges for wiring and appliances, the available funds for the building of lines will be $20,000,000 annually. This would provide less than 20,000 miles of rural lines annually, and the number of consumers on said lines, based upon approved projects to date, would be about 75,000 annually, assuming that sufficient projects are developed to utilize all of the available funds.

An outstanding opinion of the Administrator that is of particular interest to our industry is that rural line projects can be undertaken extensively on a self-supporting and self-liquidating basis where the prospective consumers average less than four per mile and the individual may be as small as 25 miles of lines, with an average of about 100 miles. The above averages are derived from the first 70 projects approved by the Administrator and it is indicated by him that as the number of projects throughout the country increases, the average of prospective consumers per mile of line may be less rather than more.

It is clear that the industry, in its extensive experience in rural and farm service, has found it impossible to realize anything like the estimated results upon which the REA program is based. In fact, it has been the experience of the companies of the industry that rural service of such density, or even considerably greater, can only be undertaken by companies as promotional efforts in such limited degree as they can afford to promote and carry in connection with their general operations.

The Administrator insists that past standards should be largely ignored in the light of the greatly changed conditions to be rapidly brought about through the REA program.

Now that the policies and intentions of REA are known, it is evident that what the industry must regard from its own experience as an exceedingly optimistic experiment is being undertaken by the Federal Government without any admitted doubts of assured success. The industry has been charged with undue caution in the preservation of its capital resources and current earnings in delaying extension of its service into the less remunerative rural and farm areas. REA is now undertaking to demonstrate that fair earnings from a much more rapid extension of such service may be more immediate and assured than the industry believes to be possible. The result of this experiment will determine whether or not the Government will be able to recover the money represented by its "self-liquidating" loans.

The industry for the present has no alternative but to await the outcome and realize that it will be called upon to pay its share of whatever tax burden is initially and finally assessed.

The public utility industry is sincerely proud of its past record with regard to the promotion of rural electrification, notwithstanding unwarranted political attacks and criticisms, including misleading and largely irrelevant comparisons with conditions in other countries of the world. Certainly the industry favors the most rapid extension and broadest possible utilization of electricity throughout the rural and farm areas of the country, consistent with sound financial consideration.

The companies of the industry will continue to extend their rural and farm service as rapidly as is believed to be consistent with their obligations to all of their consumers, present and prospective. It will not be surprising if the operations of the Rural Electrification Administration serve in many ways to confirm the soundness of the policies pursued by the industry and supplement its activities in furthering the extensions of rural electrification.

Merchandise Accounting

(*Continued from page* 282)

pliances as a utility function will be settled.

In conclusion, it would appear that merchandise accounting means, in addition to accounting, the adoption and use of statistical computations in the preparation of trustworthy reports upon which the exercise of executive business judgment may be based. Of course, in reaching his decisions, the boss is confronted with such other problems as independent dealer aversion to the company destroying his alleged prospects for sales; the "go-getting" sales efforts of the utilities, which the latter claim is only observing the Biblical injunction against slothfulness in business; the absence in many of the small towns of dealer stores; the salutary effect upon the dealer's own selling efforts of utility sales competition, etc., but this paper is not here concerned with these angles of the matter.

The Honorable W. M. Daniels, a member of the Interstate Commerce Commission, said on one occasion: "I know enough of the science of accounting to know that bookkeeping is only its language, and that its controlling spirit is nothing short of enlightened economic philosophy."

It would appear that here is one way in which the accountant can emerge from his generally accepted status of historian of things past and lend a helping hand to the doing of things to come.

Home Cooling

(*Continued from page* 296)

$50,000,000 to say nothing of the equipment and installation sales of $850,000,000 or more.

The proof of worth is the value placed on an appliance or service by the user. Of more than 150 installations of Home Cooling by Attic Ventilation on the system of the Texas Power & Light Company, we have 100% customer satisfaction. Without exception the users will endorse this method of cooling and will recommend it to their friends.

New Developments in Farm Wiring

By E. A. Brand

Commercial Engineer, Niagara Hudson Power Corporation, Buffalo, N. Y.

An Address before the Third General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 3, 1936.

TYPES of rural customers and conditions encountered in rural electrification the country over, naturally, are widely varied. However, when certain problems are eliminated, such as power uses for irrigation and rice growing, and the share-cropper and cotton farmer of the South, all of which are highly special, it is found that the remaining types of farms have electrification problems which, to a great extent, are fairly similar, regardless of location. Among these are dairy farms, poultry farms, truck or produce farms, fruit farms, crop or grain farms, and general farms combining the characteristics of several of the above.

The problem of electrifying the group of buildings on any of these resolves itself into:

a. Wiring the house for lighting and for the usual appliances, including a water pump.
b. Wiring the outbuildings for lighting and for various farm equipment applications, depending on the nature of the farm.
c. Supplying a yard distribution system which carries power to each building and supplies yard lighting.

Endless lists of rural uses of electricity are available and nothing would be gained in reviewing these. Similarly, a detailed analysis of the electrical design problems peculiar to each type of farm is impracticable. Hence this discussion will cover such general factors as economy of materials and methods, adequacy of the installation, and similar items that affect the customer's pocketbook as well as utility revenue. While these details may contain many technicalities, the problem should have executive interest because of its important bearing on the prospects for making rural lines pay their way.

There are many reasons why we should concern ourselves with the wiring and equipment problems of our new rural customers.

1. The sale of lighting and of appliances is facilitated by complete wiring, and seriously hampered by inadequate wiring.

2. These new customers who, in most

MR. BRAND

cases, have only a limited supply of funds available, know nothing of the wiring required and frequently very little of the agricultural uses of electric service.

3. Electrical loads to be wired for in the country are heavier and more diversified than in the city. The city contractor frequently is not familiar with rural conditions and the rural crossroads contractor is frequently ill equipped to act as an unbiased and intelligent consultant, as he is operating under competition and, often, with a rather meager equipment of business fundamentals.

4. If the farmer is properly guided, he may secure more outlets and heavier copper for the same investment, or may buy an adequate installation at less expense, thus leaving a greater portion of his total funds for appliances and equipment.

5. The days of the old house-wiring campaigns when six-room residences were wired complete with drop cords for $21.00 are now a sad memory. Rural electrification in one sense is another old house wiring campaign, but with trimmings of electric ranges, 5-hp motors, henhouse lighting, soil heating cable, milk coolers, IES lamps, and the like. These new customers should have the benefit of experience over the years so that they will not cause us similar regrets ten years hence.

Two recent investigations of the cost of farm wiring and equipment, one on the West Coast and one in Massachusetts, indicate that for a 600 kwhr per year customer, wiring alone may average from $100.00 to $112.50, while for a 2000 kwhr per year customer, the costs may average from $170.00 to $325.00. Examples could be cited where wiring costs have exceeded $900.00. Such investments represent a serious problem to the majority of our new customers and deserve guidance from the utility.

This aid should further the following objectives:

a. Use of the lowest unit cost safe materials.
b. Adequacy within the customer's means.
c. Assurance that the wiring contract is fulfilled.

a. Use of the Lowest Unit Cost Safe Materials

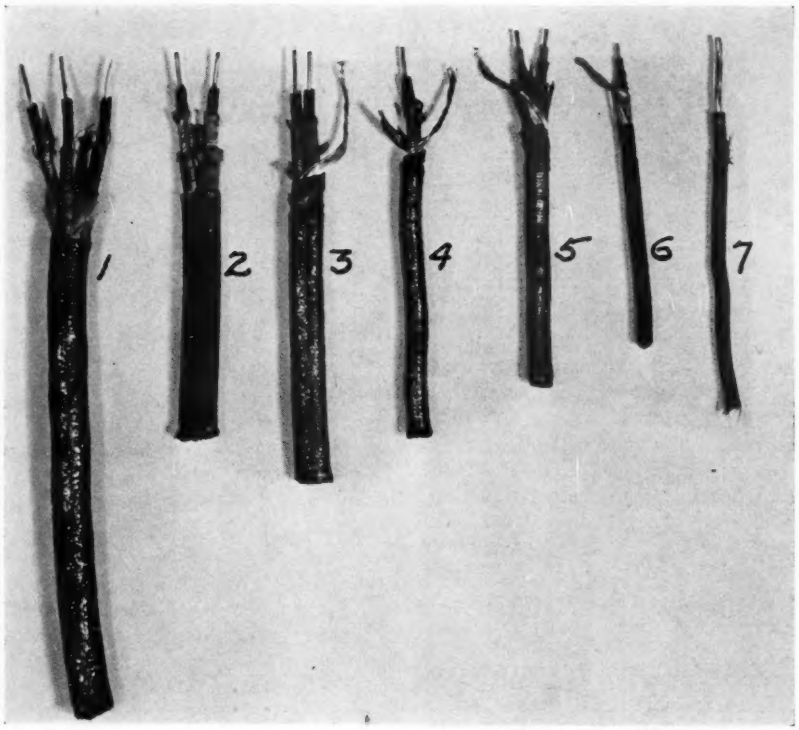
The question of wiring materials covers a wide field, filled with tradition, commercial rivalries, contractor inertia and, all too frequently, with deplorable ignorance or indifference on the part of the utility.

To say that wiring in all cases should be in accordance with the requirements of the National Electrical Code as interpreted by the local enforcement agency is not sufficient, as the question of cost for equivalent materials enters. Many different wiring materials are approved by the Code to serve the same purpose; namely, to conduct electricity to the point where it is used, but not all of these materials cost the same to install nor do the highest-priced ones necessarily provide the most satisfactory installation.

In this connection, the sixth edition of the Standard Handbook for Electrical Engineers contains an interesting table:

Method of Wiring and Relative Cost (Labor and Material)

Knob-and-tube work	100%
Non-metallic sheathed cable	125%
Armored cable	133%
Electrical metallic tubing	180%
Rigid conduit	196%



Cable Types

No. 1 and 2—Standard non-metallic sheathed cable, all conductors insulated, No. 14 three-conductor and No. 14 two-conductor.

No. 3 and 4—Protected neutral cable with insulated neutral or grounded conductor, No. 14 three-conductor and No. 14 two-conductor.

No. 5 and 6—Another type of protected neutral cable (U.S. Rubber Products Co.) No. 14 three-conductor and No. 14 two-conductor.

No. 7—A No. 10 AWG rubber covered wire for size comparison.

The relatively low cost of knob-and-tube work and of non-metallic sheathed cable is of significance in rural areas, as the 1935 edition of the National Electrical Code, in Article 5 on Wiring Methods, makes the following recommendation:

"On premises where a continuous underground metallic water piping system is not available as a ground electrode and where it is not practicable otherwise to secure a ground of permanently low resistance, the use of a wiring method which does not employ metal enclosures for the wires is recommended, unless the character or occupancy of the building is such as to require the use of a metal enclosed wiring system."

This recommendation applies directly to rural areas where it is notoriously difficult to obtain a ground connection of permanently low resistance. Hence, the National Electrical Code itself actually recommends that non-metallic systems be used in these localities.

Knob-and-tube work is highly satisfactory for farm buildings and its use should be encouraged. In the many sections of the country, however, where its installation has become practically a lost art, the use of non-metallic sheathed cable should probably be urged.

Whereas armored cable may be used only in dry locations, non-metallic sheathed cable may be used in every part of a farm building, whether moist, wet or dry, and is prohibited only outdoors and underground. In addition to outlasting metal systems in buildings which are sprayed or where cattle fumes are prevalent, the outer sheath, being non-metallic, cannot carry current which may be fatal to cattle, as may happen when the "hot" conductor in a metal-clad system accidentally contacts the armor and high resistance prevents blowing a fuse to clear the circuit.

There is now available a simplified non-metallic assembly, known by various names as "Protected Neutral Cable" or "Type CNX," and others.

This material, which initially is priced about 17 per cent under standard non-metallic cable, is intended for branch circuit and feeder work and has just recently been approved by Underwriters' Laboratories for "trial installations." Its use is not yet recognized in the Code but it may be installed by special permission of the inspection authority. The neutral or grounded conductor is uninsulated, but a non-metallic overall braid prevents it from coming in contact with grounded objects or surfaces. Hence, it will not give rise to stray currents.

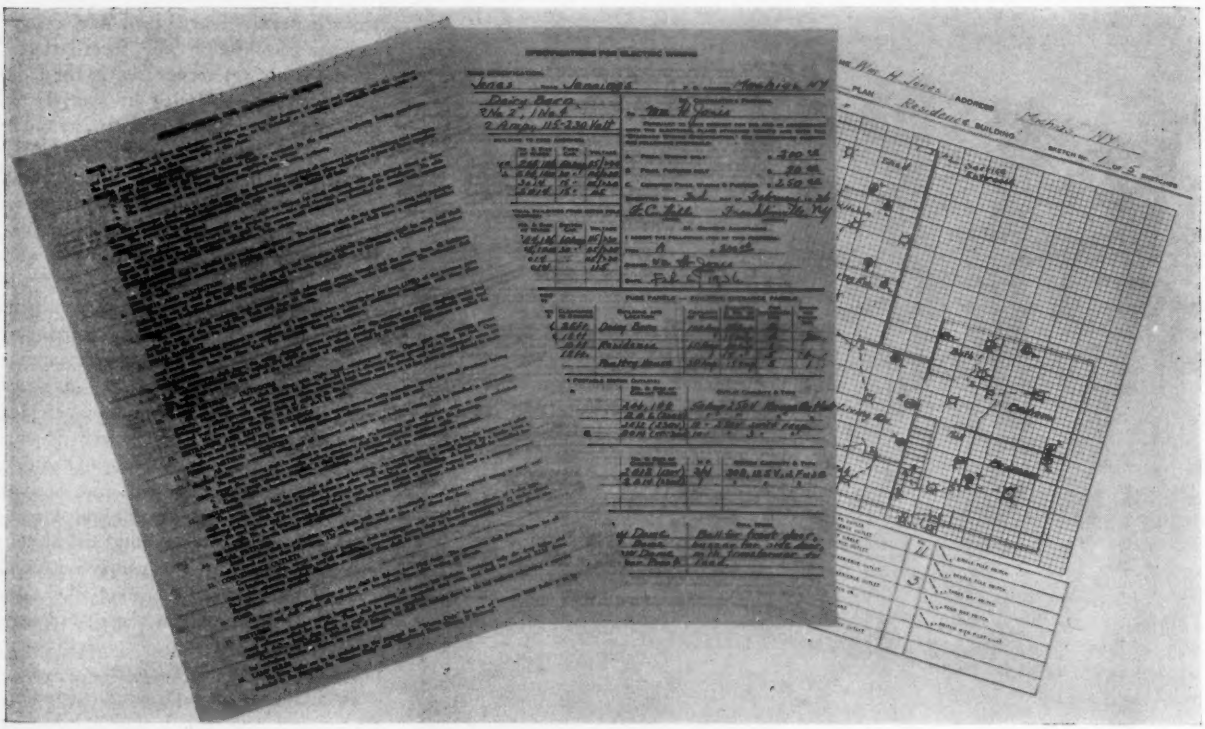
Protected neutral cable is an important development in wiring technology and one that deserves the hearty support of all utility companies. Uninsulated neutral conductors, commonly referred to as "bare neutral" or "concentric wiring" have had a long and stormy history, caused by commercial jealousies and by a smoke-screen of thinly grounded technical distrust thrown around the system by selfishly interested or poorly-informed groups. Due to the use of the non-metallic outer braid on the new assemblies, all valid technical objections to uninsulated neutrals disappear.

In addition, manufacturers of wiring devices are now developing a complete line of self-contained convenience, switch, and fixture outlets for use with the new assembly, which will eliminate the usual steel switch or outlet box. It is hoped that they will be available later this year.

It will be well to examine the National Electrical Code and to identify and place into effect locally some of the liberalizations that have been introduced in recent years. They produce savings in cost of material per foot varying from 25 per cent to more than 70 per cent. Among these are the following:

1. Uninsulated-neutral service entrance cables in place of conduit.
2. Service cable (type SD) as a feeder to an electric range.
3. An uninsulated No. 4 copper wire as a common grounding conductor.
4. The use of non-metallic cables as motor circuits.
5. Non-metallic surface extensions for convenience outlets.
6. The use of "combination range switches" in house and barns.
7. Pole meter installations where several buildings with appreciable load are to be wired.

It should be the aim of each local operating group to place such modern low-cost wiring practices into use in its area. To do this it frequently becomes necessary to mold local electrical opinion into new ways of thinking and it is essential actually to assume a position of friendly



Specification form and plan sheet developed by Empire State Gas and Electric Association for use in drawing plans and specifications for wiring of farms in New York State

leadership in this phase of the electrical business.

b. Adequacy Within the Customer's Means

The term "adequacy" has been used by the industry to such an extent that it has become trite. Nevertheless, it expresses fully one of the chief objectives to be aimed at in farm wiring.

An axiom to follow might be: "What wiring is done, do well," and in this connection the service entrance is of prime importance. Every killowatthour used on the farm passes over the entrance wires and through the main switch. They should be large enough to take care of inevitable future growths in load as well as initial modest demands. In no case should the main service be of less than 60-ampere three-wire capacity, and many farms require 100-ampere three-wire services.

Just as important are the feeders comprising the yard distribution system and the individual entrances to each building. These represent a substantial part of the whole cost, and should be designed with future motor and heating loads in mind, so that they will not handicap sales five years from now.

It is impractical here to answer the wiring design problems for individual equipment encountered on each type of farm. But the soundest general plan provides for service entrances and feeders of initially large capacity, even though it may be necessary to defer wiring of a portion of the building interiors until a later date. Bulletins available from agricultural colleges, from manufacturers, and from many utilities give detailed information on wiring of specific buildings and for specific application; hence will be found useful for design purposes.

c. Assurance that Wiring Contract is Fulfilled

It is not sufficient merely to recommend certain construction materials, or copper and switch sizes, and a certain number of outlets; these actually must be specified to the wireman. If no definite plans and specifications are available on which the wiremen may base their cost estimates, it will be found that the successful contractor, in practically all cases, has figured on a less complete job than did the unsuccessful bidders.

It may seem a novel thought that the utility should prepare electrical plans and specifications for wiring and lighting a farm and yet the operator of every dairy farm and poultry farm, at least, should have the benefit of this service. Such a plan is now in use by companies in upstate New York, utilizing simple forms and a routine development by a committee of the Empire State Gas and Electric Association. Not only is it a profitable venture from the long-range load-building standpoint, but it is an excellent means of building customer goodwill and appreciation. In addition, it aids in securing quick acceptance of low unit-cost wiring materials.

Another step that has been taken in certain localities consists of an inspection, at no cost, by the Fire Underwriters' representatives or Company inspector, as the case may be, of the completed wiring installation for compliance with the plans and specifications previously prepared. This is a service appreciated by the customer.

Conclusion

In conclusion, may I make a plea for an aggressive attack on this situation. To do so necessitates becoming versed in a complex technical problem that all too

(*Continued on page* 316)

Developments in Farm Lines

By A. E. Silver

Consulting Engineer, Ebasco Services, Inc., New York, N. Y.

An Address before the Third General Session of the Fourth Annual Convention of the Edison Electric Institute, St. Louis, Mo., June 3, 1936

NOTWITHSTANDING the many other factors involved, I feel safe in the statement that the investment required to build the line extensions and install the services, constitutes the largest single obstacle to self-supporting farm electrification—the objective that previous speakers have so well presented. When discussing a single sector of a broad problem it is very easy to lose sight of other factors that carry just as real weight in overall conclusions. This is particularly true at a time of curtailed loads, such as our industry has been going through, with the natural urge to put slack capacity to work wherever it may exist in the system. Nevertheless, it is basic in the farm electrification problem, that every kilowatt of load picked up on these farm lines and brought back to a suitable existing point of supply, does preempt prime capacity in distribution feeders and substations, transmission lines and substations, and generating stations.

Rural electrification began many years ago by service to more or less scattered towns and villages which were large enough to justify the cost of extending power lines thereto. Service to the farm proper started in a very natural manner as a by-product of these rural lines, or more directly, from urban feeders extended to adjacent farms.

In this earlier period of building lines out through the rural areas, the types and designs established in urban practice were applied. "Cut and try" was a necessary procedure. Extensions were made, one by one, with the objective of reaching one or more towns or villages, and the hope of some time extending to other neighboring communities, without knowing in what order. It became the practice, therefore, that each line have capacity enough for meandering from village to village. This was a natural and necessary period in the taking root and growth of service to the farm. The uncertainties were far too great to even suggest trying to lay out for any considerable area, a minimum of ultimate line mileage and of copper.

MR. SILVER

About ten years ago the farmer's growing realization that he needed electric service, and the persistent effort of power companies to get this service to him, made possible a more comprehensive approach in selling farm service and building farm lines. Systematically planned and carried out farm extension sales, engineering and construction effort could then get a start. Then began the era of engineering farm lines in their own right. Both the salesmen and the engineers could go back to fundamentals, check the suitability of practices that had come about, and build up a fresh procedure better fitted to the conditions.

Farm electrification has advanced steadily. Figures from the U. S. Census sources show progress of central station service as follows:

	Farms Served
1923	177,561 or 2.8%
1930	596,014 or 9.5%
1933	713,558 or 11.3%
1935	788,795 or 12.5%

Bear in mind that these values conform to the Census definition of a farm as containing three acres or more of land, therefore are exclusive of all rural residences, country stores, and roadside filling stations. Clearly these figures are far different than would be a count of rural customers under the conception of a rural area as embracing all communities of 1500 people and less.

For brevity and to be more specific, I shall narrow down to these developments in farm lines as they have been worked out by the operating companies —generally known as the Electric Bond and Share Company group. The companies of this group, from the first, with the advice of Electric Bond and Share Company service organization, have bent much effort to extending service to the rural areas and small communities. Approximately ninety per cent of all communities served by the group are of less than 3000 people. Measured against 1500 people, the dividing line between urban and rural, as used in the Rural Electrification Act recently passed by Congress, it is significant that eighty per cent of all communities served by the Electric Bond and Share Company group fall under this rural classification.

Among this group of operating companies it was, I believe, the Idaho Power Company, in a territory of favorably situated farms, that pioneered the systematic engineering-sales approach to farm electrification. In the early twenties this company recognized new business potentialities in the farming areas to justify advancing from the piecemeal procedure of extending service. It believed conditions timely for dealing with whole areas in a systematically planned manner. Energies were directed to developing a well organized working plan. By 1925 this plan was shaped up and actively being prosecuted in the field. Thorough, coordinated, engineering-sales surveys were being made. Systematic educational effort, farm by farm, by trained personnel was undertaken. In 1926 a well organized school was established for better specializing this personnel in the problems of customer equipping and utilizing electric service on the farm. This carefully planned procedure

proved to be justified. In 1935, 65 per cent of the farms in the Idaho Power Company's territory were being served.

Meanwhile other companies of this Electric Bond and Share Company group, were being guided in a similar direction in their efforts to advance farm electrification in their territories. The absolute necessity of reducing investment costs, if the strictly farm areas of low settlement density were to be served had become clear. The engineers of individual client companies were encouraged in developing and trying out new ideas in farm lines, aimed at simplifying designs and reducing construction costs. Steady progress was being made.

In February, 1934, at one of the regular Engineering Conferences, attended by distribution engineers of practically all client operating companies, the problems of farm line planning, design, construction and operation were reviewed intensively for several days. Practices and experience were discussed. New ideas were advanced. These deliberations accomplished a pretty clear, composite conception of the direction in which further progress lay, and the principles on which this progress should be built. I shall briefly outline these basic ideas and then describe a few specific examples of design and of construction results.

Planning

A well planned engineering-sales procedure embracing entire areas, along the lines developed by the Idaho Power Company, was confirmed as an essential. Systematic surveys provide scale maps of an area showing highways and farms, also provide detailed data on each farm and other rural establishment as prospective customers. These data are adequate for the intelligent preparation of estimates of service facilities and of sales programs with forecasts of earnings and of financial results.

Engineering planning finds opportunity for considerable skill in fitting to an overall area, an adequate and the most economical system of lines. This calls for the highest effective portion of this mileage in single phase farm laterals of definitely limited length and capacity. The main or backbone feeders, by function, must be of substantial capacity and usually three phase. Design planning also coordinates features of supply and of circuit control, usually with net savings, because measures can be adopted that could not be afforded under a piecemeal extension procedure.

The backbone rural feeders and supply facilities need to be adapted to the specific conditions of each situation. While these constitute a very real part of the investments, it is evident that, for some time at least, the major opportunity for economies rests in the simplification of the single phase farm lines or laterals. Quite largely, these farm laterals can be tapped from existing rural or industrial feeders.

Quality of Service

Service entirely adequate and satisfactory for the normal needs of the farm must be provided. This does not mean that standards of service practiced in urban areas should be transplanted to the farm without reflection upon unnecessary refinements. The farmer does not wish to pay for that which he does not need. There are two essentials:

a. Reasonably steady voltage held within a range to give good performance of heating appliances. With the general level properly set a maximum overall range of from 10 to 15 per cent will give good results with modern appliances.
b. Avoidance of interruptions of other than brief duration.

While prolonged interruptions are serious to many farm uses, for example, such as milking and incubators—momentary interruptions are harmful to very few, if any, farm processes.

The farms can be well served by effectively controlled radial circuits, without duplication of facilities. These farm circuits, out in the open country, will be much more exposed to lightning than the shorter and naturally shielded urban circuits. Frequent spillovers of insulators by lightning must be accepted as unavoidable. This then requires that these lightning spillovers, or faults from any cause, must be prevented from burning insulators and conductors. Except for blown transformer cutouts, burned-off conductors have been the major cause of prolonged interruptions. This avoidance of thermal damage and harmful interruptions can be largely accomplished by simple applications of modern rapid fault disconnection and circuit reclosure. Experience over the past few years has shown from 80 to 90 per cent of rapid automatic circuit reclosures to be successful.

Reliability of Construction

Farm lines and customer installations must be designed and built for reliability and good life. Servicing and maintenance attention must be kept low. This does not mean that materials should be selected from urban practice, which, for example, has been standardized on 7 to 8 inch top poles with fittings adapted to these dimensions. Strength requirements should determine pole size, and fittings should be suited to the reduced demands. Pole size does not determine pole life. The important element in wood pole life is preservative treatment. With effectively treated poles, the earlier idea of adding material against future decay is no longer valid.

Safety

Safety must be a foremost objective. Simplification of design, aiding ample primary working clearances, provides safety. Grounding is a generally accepted requirement for public, customer and workman safety. In the country where grounding installations do not have the benefit of extended water pipe networks, the common primary and secondary neutral, run continuous from customer to customer, has a definite advantage. All grounding installations are thereby placed in multiple, providing a definite safety feature.

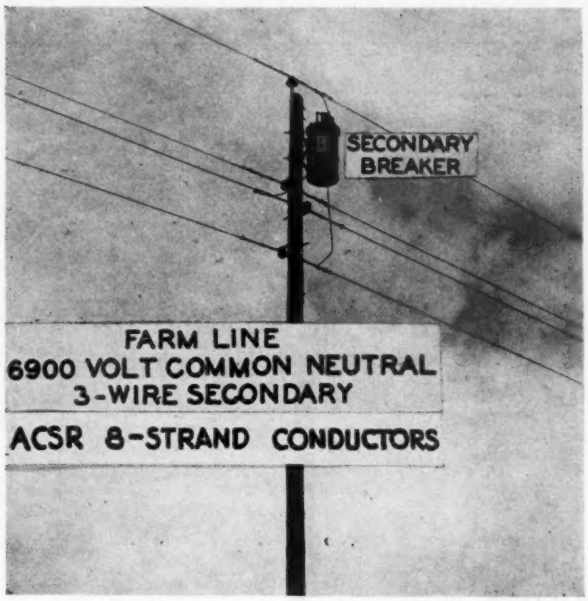
Simplicity

The aim—all available reduction of investment costs—calls for all practical simplification, both in major features and in details. In the present stage of the farm line development, it is important to seek savings, even though of only a few cents, in every possible item. These minor savings when added up, constitute a large item in the whole.

The simplest type of farm line is the single phase circuit with the two wires supported on the pole without crossarms —one wire being uninsulated and multi-grounded as a common primary and secondary neutral. This single phase lateral can be tapped directly from a three phase, four-wire grounded neutral backbone rural feeder.

Where the main feeder is three wire, eithe delta or star-connected, this same type of lateral can be tapped off by utilizing a special one to one, or similar ratio transformer, as a means of establishing the ground on the farm line circuit. This may not be economic for short lines, however.

The new single bushing farm type transformer is adapted to this type of circuit. With the transformer installations approaching one per farm customer, individual transformer accessories become disproportionately expensive. This offers another opportunity for simplification by omitting at individual installa-



tions and centralizing at strategic points, certain functions, such as of transformer taps and primary cutouts.

Right of Way

While farm lines must be built on or near the highways, location and alignment, particularly with relation to tree conditions, are substantial elements in simplifying construction and determining operating and maintenance costs. The rapidly increasing guidance in pole location, by highway officials, varying among the states, must be recognized and may be a factor in determining costs.

In some situations, location on private property just off the highway, either continuously or for intermittent stretches, may be decidedly advantageous. The procedure in securing right of way must be planned to gain and utilize the full cooperation of the farmers at interest.

Coordination with Communication Circuits

Frequently, if not usually, these farm lines must be built in close proximity to communication circuits; most of these being telephone circuits serving the same farmers that are to become electric power customers, and many being of the ground-return type. Probably most of these were built some years ago on the easiest locations and, unfortunately, with little attention given to being neighbors with power circuits that might be built later.

Problems of both physical and inductive coordination are encountered in these situations and must be worked out by the parties at interest. Modernizing the telephone circuits by metallicizing and confining to one side of the highway will generally be required. Cooperative steps should be initiated at the beginning and carried on as the needs require. Coordination of these types of facilities is a technical problem, requires specialized engineering study, and has never been satisfactorily worked out in ahy other way.

Voltage Regulation

The higher voltages for rural distribution circuits materially reduce the problem of voltage regulation, also frequently provide further savings by avoiding step-down substations. In a situation, however, where the voltage level is unsatisfactory, centralized control rather than providing taps in all individual transformers is conducive to simplicity. A simple booster transformer installed at a circuit junction will provide the needed voltage level adjustment. Where the voltage drift is considerable, such booster transformers may be equipped for simple, one or two step, automatic throw-over, should this be found advisable. It is a task and expensive to change taps in individual transformers, but this becomes easy with the booster.

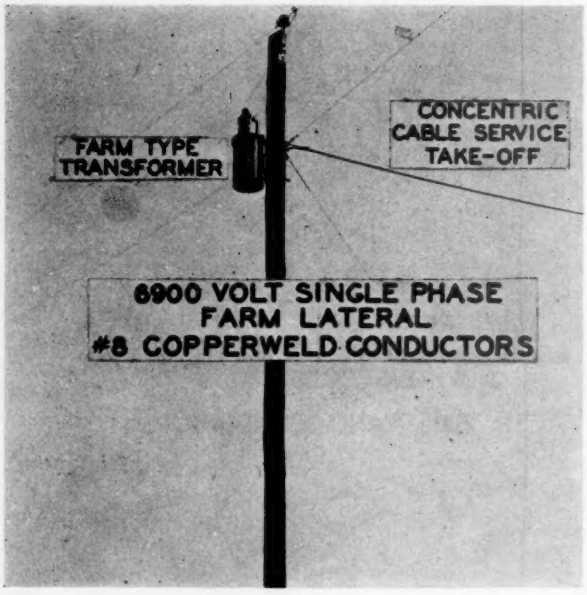
High Strength Conductors and Long Spans

With the strictly farm lateral design, effort can be concentrated on the mechanical features of the line. The most obvious simplification can be gained through the combination of high strength conductors and long spans. Conductors may be of any reliable high strength material with only very moderate conductivity. With the lower primary voltages, conductivity requires somewhat greater consideration. While hard-drawn copper has prevailed, other conductors of greater strength may be used to advantage, including galvanized steel and either copper or aluminum reinforced by steel. Splices, ties and taps are available for these conductors. However, the present concentration on these details doubtless will bring improvements.

This long span construction is an adaptation from the extensive experience with high voltage transmission lines. The objective is to utilize as much of the conductor strength as practical. The control of high frequency mechanical conductor vibration effects is an inherent problem, and must be taken definitely to account in design. Past experience and study give a good insight to the technique of avoiding vibration fatigue. Localized conductor stresses at supports, taps and splices must be kept on the safe side of the fatigue limit.

Transformers

At the Distribution Engineering Conference previously mentioned, the fact stood out that the stage had been reached where it was costing as much, or more, to provide the transformers and complete the customers' installations as for the line itself. This was the incentive for a simplified transformer installation. Several things could be done in the transformer design, including: omitting taps,



eliminating one primary bushing, connecting the neutral end of both primary and secondary windings to the transformer tank interior, incorporating an open spill gap from primary terminal to tank for protecting transformer insulation from lightning, eliminating conventional hanger irons by mounting directly on the pole with interchangeable mounting dimensions for all sizes, omitting terminal provisions for series-multiple connection of secondary coils.

About fifteen months ago our service organization presented these ideas to the manufacturers. Their prompt cooperation resulted in the advent of the now reasonably familiar single bushing farm transformer.

This transformer with stud type primary bushing through the cover is especially well adapted for a short direct tap from the primary conductor, providing both convenience and safety. This tap can be made with a light-weight clamp, handled by a "hot stick" and quickly disconnected wherever any work is to be done on the transformer.

Primary Line and Equipment Protection

It is fundamental that circuit faults from lightning and other causes must be accepted, but that thermal damage and prolonged interruptions therefrom must be avoided. This can be done by the application of modern, reasonably simple, automatic circuit opening and reclosing devices. These may be either automatic reclosing circuit breakers or automatic reclosing fuses. For restricting the area subjected to an unavoidable permanent fault, a simple fuse may be installed to cut off any selected section of a circuit. This would be set for delayed opening, but to function before the automatic reclosing control reaches the lockout stage. These reclosing circuit control devices may be installed only at the supply station, or also at junction points in the line, depending upon the geographical extent of the circuit.

A spill gap at each installation for the protection of transformer insulation may somewhat increase the number of times that these reclosing devices will be called upon to function; however, with effective fuse and relay coordination this increase will have no practical effect on service. Insulation levels need not be higher than adequately to provide against surges of internal system origin.

With this type of control and a protective gap at each transformer, transformer primary cutouts can be omitted. To protect service from a permanent fault in the event of a damaged transformer a weak link can be installed in the primary lead, preferably inside the transformer tank, calibrated to open on nothing less than a burned out winding. However, when effective secondary protection is used the need for this device may be negligible.

Secondary Protection

It is impracticable to prevent transformer damage from overload by primary fusing, especially in the smaller sizes. Overload protection is desirable although probably not urgent. For suitable calibration, it should be in the secondary side. The simple form of such protection is a fuse in the secondary lead, and devices of this kind are available. Nevertheless, a thermally actuated automatic circuit breaker, incorporated in the transformer will be the ideal device, if and when available at low cost.

Services and Meters

Simplification in services and meters may be accomplished by the effective use of recent developments and materials, including such items as the outdoor meter and non-metallic service entrance cable. Open wire construction will be the most economical where suited to the conditions.

Construction Methods

The field conditions for building farm lines are decidedly unlike those in urban areas. The problems of transportation, working equipment, working methods, crews, are all different. Farm line construction needs to be organized on the peculiar merits of the local situation. Simplification is effective here.

Results

During 1935 rural lines in the aggregate of 3300 miles were built by the operating companies of Electric Bond and Share Company group. The programs for 1936 aggregate about 5000 miles, although not all of these lines can be of the fully simplified type. I shall not attempt any quantitative summary of this construction for all client companies. However, merely as examples, specific lines worked out along the ideas de-

Recent Examples of Low Cost Single Phase Farm Lines

	Arkansas Power & Light Co. "Benton Rural Line"	*Louisiana Power & Light Co. "Choudrant-Downsville Line"*	*Memphis Power & Light Co. "Mt. Moriah Road Line"*
Mechanical Loading (N.E.S.C. basis)	Medium	Light	Medium
Length of Line	8 mi.	16 mi.	1 mi.
Customers per Mile	5.5	2.1	4
Terrain	Hilly. Road Crooked	Hilly. Firm Clay Ground	Road Partly Crooked, Firm Clay
Location	On Highway	On Highway	Part on Highway, Part Private Right-of-Way
Primary Voltage (Phase to Neutral)	7620 v	7620 v	6900 v
Configuration	Vertical Spacing with Pinnacle Pin Primary	Vertical Spacing with Pinnacle Pin Primary	Vertical Spacing with Pinnacle Pin Primary
Average Span Length (With Secondaries Present)	340 ft.	350 ft.	....
Average Span Length (Primaries Alone)	340 ft.	448 ft.	500 ft.
Length of Secondaries in Percentage of Primaries	33%	31%	None
Poles (Prevailing)	30 ft. 5 in. Top Creosoted Pine	30 ft. and 35 ft. Class 7 Creosoted Pine	30 ft. Class 8 Creosoted Pine
Primary Conductors	No. 6 Bare H.D. Copper	No. 4 A.C.S.R.	No. 8 Solid Copperweld
Secondary Conductors	No. 6 Bare H.D. Copper	No. 4 A.C.S.R. and No 6 Copper	None
Service Conductors	No. 8 W.P. Copper	Concentric Cable 2 No. 6 or 2 No. 6 plus 1 No. 8	Concentric Cable 2 No. 8
Number of Distribution Transformers	8	16	3
	COSTS		
Primaries and Structures (per mile)	.....	$365.00	$393.00
Secondaries (per Customer)	.....	28.00	None
Transformers, Services and Meters (per Customer)	.....	68.00	91.00
Total per Mile of Line	$660.00	$632.00*	$759.00
Total per Customer	$120.00	$300.00*	$190.00

* These totals include a small step-down transformer substation, 13,200 v to 7620 v, with reclosing fuse, amounting to $44.00 per mile.

scribed above, and built by three of these companies are described. These examples purposely have been selected from what may be called the Mississippi Valley area in the belief that the conditions which prevail will be familiar to the majority of those in the audience.

The essential design features of these examples are given in the accompanying tabulation.

It must be carried in mind that these examples are taken from areas where medium and light climatic loading conditions prevail, and that equivalent lines built in heavy loading areas would be more rugged and costly.

The figures in the tabulations also give the essential items of construction costs for these specific examples of farm lines, broken down in dollars per mile and in dollars per customer. These figures do not contain allocations of general system investments, nor for backbone feeders, substation or junction controls, special supply transformers, and the like, except that the totals for Louisiana Power & Light Company contain $44.00 per mile for the latter item.

Service

The period during which these lines have been in operation is not sufficient for any final judgment, nevertheless the results to date have been satisfactory and gratifying. All companies reporting, state that satisfactory service has been maintained, service calls have been moderate, prolonged interruptions have been infrequent. Definite figures as to the number of momentary interruptions are not available, but these have not been objectionable. Satisfactory voltage regulation has been reported. Booster transformers have seldom been needed and even more rarely where the higher distribution voltages have been used.

Mechanical Performance

As would be expected, no appreciable maintenance experience has yet accumulated. However, the lines constructed by client companies last year were subjected, in practically every locality to severe weather conditions. No difficulty whatever has been reported from failure of poles and supporting devices, other than an occasional yielding guy anchor. Certainly, thus far, there is no support for the skeptics who believe that these rather radically designed lines are soon going to fall down and encounter disastrous maintenance expense.

A few examples of this simplified type of line in service: In the territory of the Idaho Power Company a period of heavy sleet storms was experienced. These were disastrous to telephone lines and to a number of power distribution lines of conventional type. There was not a single failure in the farm lines, constructed on average span lengths of 500 feet. In the territory of Tennessee Public Service Company, in eastern Tennessee, a severe snowstorm coated the copper conductors of long span lines with two to three inches of snow. This condition was accompanied by a wind of about 12 miles per hour velocity. Excessive sags resulted and in some cases when the neutral wire unloaded the live wire hung below the neutral wire. However, there were no breaks, only momentary interruptions, and after the snow melted the wires returned to normal sags. The Louisiana Power & Light Company, in a normally light loading district, experienced extremely cold weather with some sleet. There was one conductor failure and this occurred at a splice. The long span lines in this case were of steel core aluminum. During the sleet storm there were two prolonged interruptions due to the lower conductor unloading and making contact with the upper conductor, but no conductor breaks at these locations. Some long span lines in Florida withstood the hurricanes of September and November, 1935, much better than short span urban construction.

In two situations a few conductor breaks by fatigue from high frequency vibration have been encountered on the

smallest diameter solid conductors. The causes appear evident and steps have been taken to correct the conditions. No similar difficulties have been reported for three-strand conductors.

Transformer Dependability

First experience with the new type farm transformer has been satisfactory, from all reports received to date. Out of some 1500 units installed, very few failures have occurred. Other than for a few factory errors these failures have been due to exterior secondary faults. Most of these would have been avoided by the use of secondary protection. The tendency to apply this protection is increasing.

A feature of transformer design which has been viewed with both interest and apprehension is the open spill gap for insulation protection from lightning. Reports to date have not included a single instance of failure of the gap to protect the insulation. It is true, however, that as a whole these transformers were in service only during a lesser portion of the 1935 lightning season.

The breakdown disconnecting link in the transformer primary lead deserves some improvement, as in a few isolated cases this has opened without due cause, or has failed to clear the circuit when functioning on transformer burn-out.

Conclusion

Although experience from operation to date is brief, on the whole it is gratifying and lends confidence that this simplified farm line development is capable of measuring up to the objective engineering premises. It is to be expected that further experience will bring out details which will need to be modified. It is also reasonable to expect that experience and continued study will bring improvements and further economies not at present foreseen.

The Utility's Position in the Air Conditioning Field

(*Continued from page* 294)

owner that in commercial establishments it pays by attracting more customers, increasing their interest, and stimulating salespeople to greater activity. We must be able to prove to the factory owner that air conditioning often facilitates his manufacturing processes, improves his product, and that its effect on his employees stimulates efficiency.

Air conditioning has not as yet reached the stage where it can be sold without referring to underlying principles. The automobile of today is sold on performance, beauty, and other attributes of that character, but in 1914 the buyer was interested in the transmission, the differential, and the internal combustion engine. So it is with air conditioning. Many prospects still desire to know why and how, and where we encounter that attitude, it must be satisfied before the sales presentation is made. On the larger installations, of course, technical knowledge is required to meet the situation. As a result, we have found that when sales ability is backed by a thorough knowledge of the mechanics of air conditioning, the best results are achieved.

During the last six years, utilities throughout the country carried on substantial promotion activities, the results of which are being increasingly felt. Now, with business conditions improving, and with a broad public acceptance of air conditioning, we face what gives every indication of being a banner year.

I cite our local experience as an example, which, I am told by manufacturers, reflects the general progress being made throughout the industry. In January, 1933, we were serving 91 installations, with a total load of less than 5000 kilowatts. By January, 1934, this had grown to 171 installations, with a load of approximately 5600 kilowatts. By January, 1935, the number of installations was 321 and the load slightly in excess of 6600 kilowatts. In the following sixteen months, 251 new installations were made, with a connected load of 6527 kilowatts, practically doubling the air conditioning load on our lines.

What of the future? In my opinion, cooperation between utility and manufacturer in charting the industry's future course is essential. It may be too early to follow in the steps of the Electric Refrigeration Bureau. It may be that never can we successfully use the same means to reach our objectives as did that Bureau, but the shining example of the operation of that body will bear the closest examination, and should we decide that we cannot make use of the methods that resulted in its outstanding success, we should be able to answer clearly the question—if not, why not?

Hidden Costs at Muscle Shoals

(*Continued from page* 271)

In other words, if, instead of building the dam, the government had bought and then and there destroyed every ton of freight which presented itself for passage, the taxpayers would have saved in interest and out-of-pocket expenses alone, $2,700,000. And yet this "navigation" constitutes the excuse for writing down the electric investment at Muscle Shoals still further, so that, instead of its standing around $50,000,000 it will finally be carried on the books at somewhere in the neighborhood of $20,000,000.

The entire undertaking shows the inevitable outcome of ill-advised and uneconomic projects and of the theory that in order to sell electricity all that is necessary is to build a dam. This year, the Secretary of the Treasury will disburse interest on nearly $73,000,000 that he has borrowed for the account of Muscle Shoals and no amount of "write downs" or "valuations" will change this figure by one red cent. And next year he will pay interest on some $75,000,000, and so it will go until electric rates are raised to what they really should be and the project at last becomes a truly self-supporting enterprise.

Swiftly—Easily—Cheaply

Today the average residential electric customer pays less than $3.00 a month for service—at the lowest average rate in history. Even customers using electric power for a multitude of purposes—refrigeration, cooking, incidental heating, washing, ironing, etc.—pay less for power than they do for amusement, shoes and similar items.

It is difficult to compute the great dollars-and-cents benefits this brings to the average family—and it is impossible to compute the infinitely more important benefits that follow when back-breaking tasks are performed swiftly, easily and cheaply by power. If the sole achievement of the private power industry had been its record in lifting tremendous burdens from the shoulders of the housewife, its place in history would be a great one.—*Catskill, N. Y., Examiner.*

POWER SALES ITEMS

AIR CONDITIONING

"New Uses for the Psychrometric Chart in Simplifying Air Conditioning Problems," by William Goodman. *Heating, Piping & Air Conditioning,* May, 1936, p. 262. Keeney Publishing Company, Publishers, 6 North Michigan Avenue, Chicago, Illinois.

Reheating of the chilled air supply to conditioned rooms having low heat ratios and the run-around cycle used for reheating.

"12-Story New York Apartment Installs Year Around Conditioning," by J. F. Kern. *Heating & Ventilating Magazine,* May, 1936, p. 51. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

Forty-four apartments containing a total of 253 spacious rooms are now being air conditioned in a comprehensive rebuilding of a major residential building on New York's exclusive Park Avenue.

"Air Conditioning Aids Utility Employees," by Leslie S. Tarleton. *Heating & Ventilating Magazine,* May, 1936, p. 55. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

The Philadelphia Electric Company, in common with many of the other leading utilities of the country, has been quick to recognize the beneficial results of air conditioning upon their employees.

"Museum Mechanics," by J. Francis McCabe, Supt. Buildings, Art Institute of Chicago. *Aerologist,* April, 1936. The Aerologist Publishing Company, Inc., Publishers, 666 Lake Shore Drive, Chicago, Illinois.

A paper to the Air Conditioning Engineers in Chicago giving some of the problems confronting the museums in preserving valuable exhibits and how air conditioning can solve most of these problems.

"Reversed Refrigeration Provides Year Round Air Conditioning in Power Plant." *The Aerologist,* April, 1936. The Aerologist Publishing Company, Inc., Publishers, 666 Lake Shore Drive, Chicago, Illinois.

This article gives a short description of a reversed cycle air conditioning installation and how it is employed.

"The Value of Air Conditioning In A Newspaper Plant," by Bill Abbot. *Electrical South,* April, 1936, p. 15. W. R. C. Smith Publishing Company, Publishers, Grant Building, Atlanta, Georgia.

This article describes the air conditioning installation in the Tampa Morning Tribune Building and enumerates various benefits and advantages derived from the installation. The advantages were more numerous than anticipated.

BUILDING MODERNIZATION

"Modernization of the Adolphus Hotel at Dallas, Texas." *Southern Power Journal,* May, 1936, pp. 18-21. W. R. C. Smith Publishing Company, Publishers, Grant Building, Atlanta, Georgia.

A brief story of hotel modernization in preparation for the Texas Centennial, in which increased air conditioning requires additional power and leads to replacement of power plant with purchased power.

BUILDINGS

"Is A Windowless Building A Good Place to Work?" by A. B. Snavely. *Magazine of Light,* April, 1936, p. 25. Incandescent Lamp Department of General Electric Company, Publishers, Nela Park, Cleveland, Ohio.

Hershey's new three-story office building and printing plant.

ELECTRIC MOTORS

"Problems of Motor Application for Continuous Mill Auxiliaries," by F. E. Harrell, Reliance Electric & Engineering Company, Cleveland, Ohio. *Iron and Steel Engineer,* April, 1936, p. 53. Association of Iron and Steel Electrical Engineers, Publishers, Empire Building, Pittsburgh, Pa.

A paper discussing motors for runout tables and for upcut shears.

INDUSTRIAL ELECTRIFICATION

"Fluorescent Paint Offers New Load." *Electrical World,* April 11, 1936, p. 76. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Ultra-violet light is utilized to bring out new lighting effects.

LIGHTING

"Comfortable High-Level Illumination," by A. B. Oday, W. Sturrock. *Transactions of the Illuminating Engineering Society,* April, 1936, p. 351. Illuminating Engineering Society, 29 West 39th Street, New York City.

An analysis is attempted to establish the scope of application of general lighting units to provide comfortable high-level lighting for various seeing tasks.

PLANT INTERRUPTION

"Actual Case Studies of Power Plant Interruptions," by S. H. Coleman. *Southern Power Journal,* May, 1936, p. 22. W. R. C. Smith Publishing Company, Publishers, Grant Building, Atlanta, Georgia.

Six case histories stating the cause of industrial power plant service interruptions, in which it is pointed out that the majority of such interruptions are the result of carelessness of operators.

POWER PLANTS

"U. S. Industrial Alcohol Company Builds New Power Plant." *Power Plant Engineering,* May, 1936, p. 264. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Ill.

Plant at Newark, N. J., built entirely of steel and glass.

PUBLIC RELATIONS

"Public Relations—What the Customer Wants and Will Buy," by Ernest R. Acker. *Gas Age-Record,* April 4, 1936, p. 349. Robbins Publishing Company, Inc., Publishers, 9 East 38th Street, New York City.

Mr. Acker shows the methods used by the Central Hudson Gas & Electric Corporation in keeping informed as to sales possibilities. Interesting because methods are equally applicable to electric business.

RESTAURANTS

"175 KW from Worcester Restaurant," by Louis S. Leavitt. *Electric Light and Power,* May, 1936, p. 60. Bennett-Watts-Haywood Company, Publishers, 360 North Michigan Avenue, Chicago, Illinois.

This completely electrified restaurant has an installed capacity of 117.7 kw of cooking equipment, 30 kw in lighting, 19 kw in air conditioning, and 9 kw of ventilating fans and kitchen power. In this article the author discusses the various types of electric cooking equipment, together with a general description of the restaurant.

RURAL ELECTRIFICATION

"Increasing Rural Loads with Electrically Operated Hot Beds." *Electrical South,* April, 1936, pp. 17-18. W. R. C. Smith Publishing Company, Publishers, Grant Building, Atlanta, Georgia.

This article describes a large installation of soil heating equipment in Arkansas. By means of this installation the farmer expects to be able to compete with early produce which at present is shipped up from the gulf territory at quite high prices.

STEAM ENGINES

"Steam Engines for Industrial Service. Types, Sizes, Design and Mechanical Characteristics of Modern Engines," by F. J. Vonachen. *Power Plant Engineering,* May, 1936, p. 297. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Illinois.

STEEL MILLS

"Carnegie-Illinois Steel Corporation New Hot Strip Mill at McDonald, Ohio," by John Kelly, Jr., Associate Editor. *Iron and Steel Engineer,* April, 1936, p. 15. Association of Iron and Steel Electrical Engineers, Publishers, 1018 Empire Building, Pittsburgh, Pa.

Description of equipment, how it functions, and a flow sheet of the mill are presented.

TAXES

"Alabama Fights Increased Utility Taxes." *Gas Age-Record,* April 25, 1936, p. 417. Robbins Publishing Company, Inc., Publishers, 9 East 38th Street, New York City.

A news article giving the attitude of the Alabama Legislature toward private utility taxation in an area of TVA competition.

TRANSPORTATION

"Trackless Trolley Load Too Valuable to Ignore," by A. E. Knowlton, Associate Editor. *Electrical World,* April 11, 1936, p. 40. McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City.

Lists advantages both as a power load and as a transit implement, giving results experienced by various cities.

C.E.A. Convention

The 46th Annual Convention of the Association was held at Murray Bay, Que., on June 24, 25, 26. There were over 225 delegates in attendance from all parts of Canada. The delegates left Montreal by special boat on Tuesday, the 23rd, at 5.00 P. M., arriving at Murray Bay at 7.00 A. M. the next morning.

President R. B. Baxter in his address on Wednesday morning said that public relations of power companies has emerged as the most important problem before the industry and urged Dominion-wide cooperation among all Canadian power companies.

Government ventures into business were unequivocally condemned by Mr. Baxter, who said that millions of dollars were wasted by governments going into business. Referring to the Ontario Hydro, he expressed the fear that in the not distant future this great publicly owned utility would cost the taxpayers of Ontario more millions of dollars and as usual no one political party will accept the blame.

E. H. Adams, Vice-President of the Association and Vice-President, British Columbia Electric Co., Vancouver, and B. F. Weadock, Vice-President and Managing Director, Edison Electric Institute, stressed the importance of good public relations in their addresses which followed Mr. Baxter's.

In addition to the addresses mentioned the following Committee reports were presented and discussed at the meeting on Wednesday: Employees Bureau, Rate Structures, and Customer's Service.

On Thursday morning the following reports were presented and discussed: Advertising, Industrial Power and Heating, Lighting, Appliances, Cooking and Water Heating, and Rural Service.

These were followed by a paper entitled "Selling Kilowatt Hours and Service in the Industrial and Commercial Field" by W. F. Mainguy, Shawinigan Water and Power Co., Montreal, in which were outlined the efforts made and the results obtained by the Shawinigan Co. to increase the consumption on their lines.

Another paper of interest was read by L. A. S. Wood, president, Illuminating Engineering Society, New York, entitled "Commercial Aspects of Street and Highway Lighting."

The Lighting Committee in its report called on Canadian Utilities to start the operation of lighting bureaus in their territories as a means to improved eyesight in addition to the consumption of more kilowatt hours.

The report of the Wiring Committee, which was presented on Friday morning along with the reports of the Engineering Section, urged the formation of Electric Service Bureaus in all cities of 10,000 population or over, through which the local dealers, contractors and other units of the industry could be tied together as a united body to better serve the public.

Other committee reports given during this session included Hydraulic Power, Steam Power, Internal Combustion Engines, Electrical Equipment, Overhead Systems, Underground Systems, System Coordination, Metering Equipment, Motor Vehicles, Power Systems Engineering, and a paper by W. J. McLachlan, Central Station Engineering Dept., General Electric Co., Schenectady, entitled "Research—Profitable Approach to Distribution Engineering."

L. W. Davis, National Electrical Contractors' Association, also spoke on Friday morning and stressed the importance of the utility and contractor working toward a common interest.

Officers elected for the year 1936-1937 are as follows:

President—E. H. Adams, British Columbia Electric Railway Company, Limited, Vancouver, B. C.

Vice-presidents—R. H. Mather, The Shawinigan Water & Power Company, Montreal, Que.; M. C. Gilman, Winnipeg Electric Company, Winnipeg, Man.; J. E. Lawson, Canadian Niagara Power Company, Limited, Niagara Falls, Ont.

Treasurer—J. B. McCabe, Montreal Light, Heat & Power Cons., Montreal, Que.

Secretary—B. C. Fairchild, Canadian Electrical Association, Montreal, Que.

CONVENTIONS AND MEETINGS

JULY

1 American Society for Testing Materials, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

AUGUST

31 Illuminating Engineering Society, Statler Hotel, Buffalo, N. Y.

SEPTEMBER

9-19 National Electrical & Radio Exposition, Grand Central Palace, New York, N.Y.
21-23 Rocky Mountain Electrical Association, Sante Fe, N. M.
22-25 Association of Iron and Steel Electrical Engineers, Detroit, Mich.
1-3 Illuminating Engineering Society, Statler Hotel, Buffalo, N. Y.
7-12 Third World Power Conference, Washington, D. C.
20-23 American Transit Association, White Sulphur Springs, W. Va.

OCTOBER

5-8 National Electrical Manufacturers Association, Cincinnati, Ohio
26-30 American Gas Association, Atlantic City, N. J.

NOVEMBER

30 American Society of Mechanical Engineers, New York, N. Y.

DECEMBER

1-4 American Society of Mechanical Engineers, New York, N. Y.

Farm Line Developments

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frequently is indifferently cast aside or dismissed with the vague admonition to "wire according to the National Electrical Code." Yet the customer's installation is important to healthy commercial growth of the utility supplying service, and is exceedingly susceptible to advances in technology.

The farms and other rural prospects still to be connected to the lines represent practically the last major frontier of ready-made customers with homes and outbuildings to be wired. Let us work with them and guide them in the necessary technical operations to the mutual benefit of company and customer.